THE RELATIONSHIP BETWEEN ENVIRONMENTAL TURBULENCE,

WORKFORCE AGILITY AND PATIENT OUTCOMES

by

Carol Lynn Bosco

_____

A Dissertation Submitted to the Faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

2 0 0 7

THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Carol Bosco entitled "The Relationship Between Environmental Turbulence, Workforce Agility and Patient Outcomes" and recommend that it be accepted as fulfilling the dissertation requirements for the Degree of Doctor of Philosophy.

_____Date 11/02/07
Joyce A. Verran

_____ Date 11/02/07
Judith Effken

_____ Date 11/02/07
Deborah Vincent

_____ Date 11/02/07
Neva Crogan

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirements.

_____Date _____
Dissertation Director, Joyce A. Verran

STATEMENT BY AUTHOR

This dissertation has been submitted in partial fulfillment of requirements for an advanced degree at the University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this dissertation are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the copyright holder.

SIGNED: Carol Lynn Bosco

ACKNOWLEDGMENTS

I would like to take this opportunity to sincerely thank all of those who have helped me through my journey to obtaining my PhD.

To my dissertation chair and my mentor, Dr. Joyce Verran, thank you for making research interesting and fun. I will always remember your laugh, quick wit, strength, courage and wisdom!

Thank you to my dissertation committee members, Dr. Judith Effken, Dr. Deborah Vincent and Dr. Neva Crogan. Dr. Effken, thank you for imparting your informatics knowledge and expertise. Thank you for pushing me out of my comfort zone and for encouraging me to grow. You have taught me how to think like a scientist (and for those of you who know me, that was no easy feat!)! Dr. Vincent and Dr. Crogan, thank you for your encouragement, gentle guidance and for sharing your knowledge. Thank you for your commitment to the profession of nursing. To the University of Arizona's College of Nursing's entire faculty whom I have had the pleasure to know: Thank you for allowing me this phenomenal opportunity.

To my husband/best friend, Sam: Thank you for believing in me and encouraging me to be the best that I could be. Thank you for all of the years of support, love, insight and friendship. If it wasn't for you, I am not sure where my path would have led me. Thank you to my deceased in-laws, Mary and Sam, for giving me this man!

To my furry family, Roamer, Chance, Ashton and Binx: Thank you for offering me a diversion when I needed to be writing! Thank you for your kisses, companionship and unconditional love. To my life long friends and family, thank you for your love and support. Ed Lurie, thank you for the harassment and competition– I couldn't have done it without you!

To my dear friend and confidant, Dr. Nicolette Estrada; thank you for being you. You have truly inspired me by your intellect and inner beauty. Thank you for always being there and for trying to understand what in the world I was talking about! You are going places, my friend, and I can't wait to say that I knew you when!

Thank you to my classmates and colleagues for always being there. I am so fortunate to have you in my life. What a remarkably talented group of individuals you all are. Jane, Jeff, Karen, Suk Sun, Kyung Hee and Teri – thank you for making this journey one that I would do over again in a heartbeat!

It may have been a smile; a nod of approval; taking the time to listen to me think out loud; an offer of constructive criticism. It may have been those words of encouragement; a hug; an email; a call; your presence. It all made a difference to me and my ability to succeed. They say that it takes a village to raise a child – it has taken all of you to raise me! Thank you!

TABLE OF CONTENTS

TABLE OF CONTENTS – *Continued*

TABLE OF CONTENTS – *Continued*

LIST OF ILLUSTRATIONS

LIST OF TABLES

ABSTRACT

For years heath care workers have been dealing with environmental changes which have created turbulent, complex work environments. Turbulence has been considered a negative phenomenon. However Workforce Agility may be a positive response to Environmental Turbulence. Other disciplines are familiar with the term Turbulence and Workforce Agility but there is little research available on this concept despite the impact that they may have on patient outcomes.

The purpose of this research was to identify the relationship between Environmental Turbulence, Workforce Agility and Patient Outcomes through the examination of four alternative theoretical models.

This research was conducted using secondary analysis of the IMPACT data set (Verran, Effken & Lamb, 2001-2004). The data were reanalyzed in order to answer different questions than the primary study. Causal modeling with path analysis and regression analysis was conducted to answer the research questions. Three questions included the use of either a moderator variable or mediator variable.

The setting for the IMPACT Study was acute care hospitals in the Southwestern region of the United States. For the IMPACT study, the sample consisted of patient care units from teaching and non-teaching hospitals. Subjects consisted of staff members who were employed on the patient care units.

Data collected from the Registered Nurses were used for the secondary analysis because this research was interested in looking primarily at the nursing unit. The total RN

staff assigned to patient care units who responded to the questionnaires was N=454. The total number of patients who responded to the survey was N=1179.

In summary, the unit characteristics that were found to be Antecedents to ET were the sub-composites of Team and Complexity. Proxy variables, Collaborative Culture Agility and Experiential Agility, were successfully formed as a composite for WFA and were tested with the primary data. No mediators or moderators were shown; however, main effects of WFA and ET did have an impact on patient outcomes.

CHAPTER I: LITERATURE REVIEW

Introduction

For many years, health care workers have been dealing with environmental changes (Garrett & McDaniel, 2001). Among the most significant changes are the increases in patient acuity, national concern for patient safety, new technologies, decreased funding and reimbursement, and the shortage of nurses. The changes have created a turbulent environment in health care.

Complex work environments, such as health care organizations, require worker flexibility in adapting to variations in patient needs as well as adapting to the environment (Ebright, et al., 2003). This may be accomplished through the employment of Workforce Agility (WFA) (Breu, Hemingway, Strathern & Bridger, 2001).

Other disciplines are familiar with the term "turbulence"; however, less research has been conducted on this phenomenon from a health care perspective. The impact of Environmental Turbulence (ET) has been shown to have a negative impact on nurse performance (Sayler, 1995). However, the concept of WFA has been emerging, and it may have a positive impact on ET (Bosco, 2004; Breu, et. al., 2001; Nursing Executive Center Advisory Board, 2005). A potential key to improving patient outcomes is to understand ET and identify ways to decrease or diffuse its impact on patient outcomes by creating an agile workforce.

This research will examine the relationship between ET and WFA and its effect on Patient Outcomes by testing four alternative models. The next section will give an

overview of turbulence, why it was of importance to nursing and patient outcomes, and provide an overview of WFA and its connection to ET.

Background

Overview of Turbulence

The conceptual definition of ET was based on my own (2004) concept analysis of this phenomenon in which I defined ET as an interaction between individuals and their environment in response to instability and rapid changes in their internal and/or external environment affected by attributes of the individuals, groups and/or the organization with the potential to impact patient and nursing outcomes.

During the 1980's, ET emerged in the health care environment with the restructuring of patient care delivery systems and a decrease in hospital funding was occurring (Anderson & McDaniel, 1992; Green, Rockmore & Zimmerer, 1995; Sayler, 1995; Tillman, H. J., Salyer, J., Corley, M.C. & Mark, B.A., 1997). Currently, research focusing on the health care environment has been on the rise, possibly due to the national focus on patient safety. Researchers focusing on complex work environments (Ebright, Patterson, Chalko & Render, 2003) have reported disruptions (Potter, et al, 2003; Potter, et al, 2005) and inadequate staffing levels in health care (Aiken, et al, 2000; Aiken, Clarke, Sloane, Sochalski & Silber, 2002) have been linked to negative patient outcomes.

The concept of turbulence originated within the field of aviation where it has been used to describe wind currents and patterns. There are three main conditions causing turbulence: convective currents, obstructions to wind flow and wind shear. Convective currents are localized vertical air flow created by warm air rising, causing the formation of

cumulus clouds. Obstruction to wind flow occurs when something, such as buildings, trees or rough terrain disrupts the wind flow creating air currents against the main flow. Wind shear is caused by a mechanical disruption of wind, and occurs when winds traveling at different speeds and/or different directions cause a shearing condition resulting in turbulence. This can occur without warning (Gonzales, 1998).

Four levels of turbulence have been defined based on intensity. They range anywhere from light turbulence, defined as momentarily causing slight, erratic changes in altitude, to extreme turbulence when an aircraft is violently tossed around, impossible to control, possibly causing structural damage (Ireton, 2004).

An analogy can be drawn between turbulent wind patterns and health care environments. Convective currents in health care can be considered analogous to the daily ebb and flow of providing patient care. Environmental changes occur, and depending on many other variables, there is a response which may be absorbed or may create further turbulence. Obstruction to wind flow can be likened to barriers to providing patient care such as the inability to admit patients because there were no beds creating a disruption in the flow of patient care (e.g., emergency departments). Regulatory requirements (e.g., JCAHO) could also create an obstruction to providing patient care by mandating unreasonable rules be followed such as locking medication room doors. The experience level of the nurses could also create an obstruction by the nurse not knowing how to implement a procedure. Wind shear can be comparable to acute changes in patient conditions, such as a cardiac arrest, or environmental conditions, such as an epidemic, creating an unexpected massive influx of patients and a further shortage of workers. A

sudden decrease of health care workers, such as at times of war or a natural disaster, could also create this environment which may occur with little or no warning.

The four levels of turbulence, described in aviation, can also be identified in health care. In the health care setting, turbulence can range anywhere on the same continuum such as a physician writing new orders or a unit receiving a new admission, to extreme turbulence when there is a state of chaos such as inadequate staffing levels that don't match the patient acuity.

Much of the research conducted on ET has occurred at the group level and in the acute care setting, so it has been difficult to generalize the findings to other settings and at other levels. Many factors impact ET such as the environment, perceptions of the workforce and their ability to respond (Levine, Taylor & Davis, 1984; Ma, Samuels & Alexander, 2003; McNeese-Smith, 1999). The following section will provide an overview of these factors.

Environmental Factors

Perceived environmental uncertainty (PEU) is defined as a function of the person and the environment (Garrett & McDaniel, 2001). PEU is a psychological reaction to turbulence and the inability to choose the correct actions or to predict the consequences of these actions in a changing environment (Garrett & McDaniel, 2001; Sayler, 1995). PEU influences organizations through the need for information about the environment and the need for resources. When uncertainty becomes excessive, it may become difficult for nurses to obtain information about their patients thereby impacting patient outcomes (Begun & Kaissi, 2004; Sayler, 1995).

According to the Institute of Medicine (2004), approximately 44,000 to 98,000 Americans die each year due to hospital error. Although the Institute of Medicine (IOM) didn't specifically identify the concept as ET, they found evidence related to work environments that described the concept. The IOM identified several negative aspects within health care delivery environments, such as interruptions and distractions associated with nursing care and demonstrated how these aspects of care could negatively impact patient outcomes.

Ebright, et al, (2004), found that failure to achieve desired outcomes and the occurrence of errors reflected a complex work environment. Examples of environmental issues that add layers of complexity to the nurses' work were missing information, lack of resources, missing medications and equipment; defective equipment and a culture lacking effective communication and team work.

Verran, Effken and Lamb (2001-2003) conducted a study focusing on the impact of nursing unit characteristics on patient outcomes. Their study was not meant to identify ET, however as a serendipitous finding, the concept of turbulence emerged as a latent unit variable related to workflow and the environment.

Although technology has been touted as the answer to decreasing errors in health care, many times technology has been responsible for actually creating errors. PDAs, bar-coded medication administration systems, computerized physician order entry, electronic health records, clinical decision support systems, just to give a few examples, are all compounded by a multitude of policies, regulations and interruptions. Errors can occur during the process of entering and retrieving information and the communication and

coordination processes. Technology also can impose additional work, upset smooth working conditions, decrease vigilance and disrupt communication processes (Ash, Berg & Coiera, 2004).

In health care, internal and external environmental factors may change quickly and unpredictably, altering the characteristics of patients, the units and the available resources (e.g., equipment, money and/or number of nurses). The internal environment includes the health care organization, unit and/or individuals. The external environment includes forces operating outside of the organization to which it is exposed (e.g., regulatory groups, personal issues, customers, suppliers and competition for markets and resources).

The internal environment has been shown to have an impact on job satisfaction which has been linked to patient outcomes. Emotional exhaustion, a component of burnout (Garrett & McDaniel, 2001), has been linked to unsafe work environments. Burnout is usually a consequence of long term involvement in emotionally demanding situations, such as with health care workers, and ineffective coping with long term stress. It has been found that nurses who have been in the profession a long time were more prone to burnout and were at a higher risk for leaving the organization (Benner, 1984; Ebright, et al, 2003; Ebright, et al, 2004; Foley, Kee, Minick & Jennings, 2002).

The five dimensions of burnout are emotional and physical exhaustion, listlessness, tension, and cognitive weariness. People suffering from burnout have a fear of failing. They try to protect their self image by trying to avoid exposing their vulnerabilities. They become more frustrated when they suffer a decrease in mental and functional ability often leading to an increase in dissatisfaction (Ekstedt & Fagerberg, 2005).

People experiencing burnout may have many psychological and emotional manifestations. They may lose their temper, suffer from insomnia and are unable to unwind. They may became passive and cannot react appropriately. Victims of burnout have a diminished capacity to fulfill responsibilities and a decrease in cognitive functioning in terms of concentration and decision making. They also can suffer from short term memory loss. They may have periods of blackouts where they cannot remember how to perform a simple task, or they may forget to carry out routine work. Overwhelming fatigue, brought on by burnout, may also affect performance and limit the ability to cope with every day demands (Ekstedt & Fagerberg, 2005).

Interpersonal relationships have also been cited as an important aspect of job satisfaction. Interpersonal relationships can be considered supportive or unsupportive, draining energy from the individual and/or group. Relationships between coworkers have also been shown to affect the RNs perception of quality patient care (Leppa, 1996). Effective social support provided a buffer and mediates the impact of stress on nurses (Garrett & McDaniel, 2002). If people (i.e., nurses) were satisfied, they were not as motivated to leave the workplace (Bavendam, 2000; IOM, 2004; Smith, Kendall & Hulin, 1969). Job satisfaction in nursing decreased turnover and burnout and increased RN retention. In turn, this improved patient satisfaction and patient outcomes (Bosco, 2004; McClure, et. al.1983; Harter, Schmidt & Hayes, 2002).

Some of the magnet characteristics lend themselves to decreasing ET as well as creating an agile workforce. Magnet hospitals have demonstrated attributes that enable nurses to fully use their knowledge and expertise to improve the quality of patient care.

Better organizational support has been associated with decreased emotional exhaustion. When nurses have decreased emotional exhaustion there was an increase in nursing satisfaction which increases patient satisfaction (Aiken, Clarke & Sloane, 2000; Havens & Aiken & 1999). Havens and Aiken (1999) reported that in hospitals fostering professional nursing practice (e.g., decentralized clinical decision making, autonomy, and collaborative relationships), nurse satisfaction was significantly higher, and patient mortality was significantly lower. There was less emotional exhaustion in nurses, and the work environment was considered safer by the nurses.

The external environment can create turbulence such as creating too many rules, unrealistic mandates and/or decreasing reimbursement (e.g., JCAHO, Department of Health, HIPAA). This may negatively impact the internal environment which, in turn, may create changes in the external environment. The internal environment (including the perception of turbulence) may also change, creating perceived environmental uncertainty and further creating more turbulence (Aiken, et al, 2002; Curtin, 1997; Fiesta, 1998; Garrett, D. & McDaniel, 2001; Verran, et al, 2001-2003).

Perceptions of Turbulence

Perception has been defined as the process by which an individual receives, selects, organizes and interprets information to create a meaningful picture of the world (Belch & Belch 2007). When forming perceptions about the environment, personal attributes may contribute more to the perception than the actual attributes of the objective. Nurses' characteristics such as age, experience and educational level may modify the perceptions of

perceived environmental uncertainty; however, these links and their effects need to be further studied (Garrett & McDaniel 2001; Sayler, 1995).

Workforce

When novice nurses join the workforce, they may not be prepared for the rigor and complexity of today's health care environment. The practice of the novice nurse centers on the organization, priority setting, task completion, unit workflow and meeting the expectations of their peers (Benner, 1984; Ebright, et al., 2004). Novice nurses have little experience with knowing how to effectively deal with interruptions, creating more opportunities for errors to occur. Novice nurses are taught appropriate guidelines, signs and symptoms of various disease processes, unit and organizational lay outs, use of technology and where to find what. However, they have not yet developed the capacity to manage complex assignments, or the experience to draw on to support their actions. They need to attain a certain level of expertise to pull it all together in order to efficiently and safely manage an assignment (Ebright, 2004).

Caring for multiple patients in a complex environment is challenging, and when disrupted, an error could occur (Potter, et al., 2005). Research on interruptions has shown that by performing an interrupted task over time can lead to a reduction of negative disruptive effects of those interruptions leading to less errors. As the performance of the task improved, the ability to deal with the interruptions and the process of task resumption also improved. It has been suggested that one way to help reduce the effects of unavoidable disruptions was to practice dealing with them (Cades, Trafton & Boehm-Davis, 2006). However, in health care, many experienced nurses are no longer at the bedside leaving the

novice nurses who have little experience dealing effectively with interruptions to provide patient care.

Organizing an assignment efficiently and the ability to prioritize patient needs are important aspects of patient care. This is an art that is learned by many months and/or years of experience. Experienced nurses are keepers of the knowledge. Their decisions are predominately related to knowledge of environmental complexities and how to invent alternative work-arounds. Through experience, expert nurses have learned how to manage the ambiguity and unpredictable nature of providing patient care (Ebright, et al, 2004).

Nurses can create a safe environment for patients on a daily basis despite the multiple latent failures, and are in the unique position to prevent errors (Ebright, et al, 2003). Capturing the nonlinear character of nursing practice is a challenge because it greatly impacts what types of solutions are needed in order minimize error (Potter, et al., 2005). The nonlinearity of nursing, in addition to interruptions, has created a loss of cognitive focus and errors may occur (IOM, 2004; Potter, et al, 2003).

Another important aspect of the health care workforce is staffing ratios of registered nurses to assigned patients. This has been researched in a number of studies indicating that the patient to nurse ratio is a consistent predictor of a variety of patient outcomes. These patient outcomes include complications and error rates, length of stay, incidence of hospital acquired pneumonias and urinary tract infections (Aiken, Clarke & Sloane, 2000; Blegen, Goode & Reed, 1998; Blegen & Vaugh, 1998; Kovner & Gergen, 1998; Needleman, Buerhaus, Mattke, Stewart & Zelevinsky, 2002), pressure ulcers (Aiken, Clarke & Sloane, 2000; Blegen, Goode & Reed, 1998; Blegen & Vaugh, 1998; Kovner & Gergen, 1998), GI

bleeds, shock, cardiac arrest and failure to rescue (Needleman, Buerhaus, Mattke, Stewart & Zelevinsky, 2002). An increase in the number of hours of nursing care has been positively associated with better patient outcomes for hospitalized patients (Aiken, Clarke, Sloane, Sochalski & Silber, 2002; Needleman, Buerhaus, Mattke, Stewart & Zelevinsky, 2002)

Overview of Workforce Agility (WFA)

The conceptual definition of WFA is based on Breu, et al. (2001) concept analysis in which they defined WFA as environmental responsiveness in the context of turbulence and change. WFA is an organization's ability to rapidly respond and flexibly cope with the unexpected internal and external environmental changes.

The concept of agility began in the field of air combat during the 1950's where it was defined as an aircraft's ability to change maneuver state. During the 1990's the concept was extended to the business arena where it was defined as an organizational capability to respond rapidly to changes and to cope flexibly with unexpected change in order to survive unprecedented threats from the business environment (Breu, et al., 2001). This required extensive collaboration between dispersed team members who must work together even when they were located in different physical spaces (Forsythe, 1997).

The main function of agility is to demonstrate flexibility and speed. Agile workforces might improve productivity, profitability and outcomes. In order to have organizational agility, there must first be an agile workforce. However, most of the research done on agility focused on speed and flexibility from an operations perspective of the organization instead of from the perspective of the workers. Breu, et al. (2001)

advanced the concept of agility by applying variables from the organizational agility literature to workforce literature and created five distinct characteristics of WFA. Workforce Agility is a composite variable defined by the constructs of Intelligence, Competency, Culture, Collaboration and Information Systems (Breu, et. al., 2001).

Intelligence and Competency were identified as constituting the strongest indicator of WFA. This was supported by the literature on agility which stressed the importance of recognizing changes in customer needs and market changes. Intelligence involved collective environmental responsiveness of a workforce and its ability to interpret external changes to adjust appropriately and rapidly. Breu, et al., (2001) defined competency in relation to information technology (IT) and software use, business and management integration process skills and alignment with the organization's direction.

More broadly defined, Competency includes a combination of knowledge, skills and attitudes of a person (e.g., nurse) who performs at a predefined level and considers the wider implications of their practice and its affect on patient outcomes. The competency of a nurse is their ability to perform consistently in different situations using skills, knowledge and attitude to achieve optimum outcomes. A nurse's competency is dependent on knowledge, skill and attitude. Effective behavior is essential to successful performance (Molloy, 2003).

Culture is defined as the development of an internal environment that capitalizes on employee empowerment and local decision making (Breu, et al., 2001). Organizational culture can be characterized as group, developmental, hierarchical or rational. Functional

group and developmental cultures are considered innovative team workers who participated in the goal of supporting a climate of quality.

Collaboration is an interaction enabling the knowledge and skills of all professionals to influence patient care. It is the workforce's capability for effectively collaborating across organizational and functional boundaries. Collaboration allows for rapid flexibility in most environments. Agile workforces are positively impacted by collaborating with the internal and external environments (Breu, et al., 2001). A turbulent environment has been shown to have a negative impact on communication skills and interpersonal relationships (Sayler, 1995; Watson, 2002).

Information Systems (IS) was defined from the perspective of the development of flexible IT infrastructures. These infrastructures support the adaptation of existing IS and the assimilation of new systems (Breu, et al., 2001).

All five indicators do not need to be present in order for a workforce to be considered agile, and they do not all hold the same value (Breu, et al., 2001). The strength of having an agile workforce is that it can buffer the negative impact of turbulence (Sayler, 1995).

Purpose

The purpose of this research is to identify the relationship between Environmental Turbulence (ET), Workforce Agility (WFA) and Patient Outcomes (PO) through the examination of alternative theoretical models. The data used for this research is the data that was collected for the IMPACT Study (Verran, Effken & Lamb, 2001-2003). The following questions were answered:

1. What unit characteristics are antecedents to the perception of ET?

2. Can a composite variable of WFA be developed based upon the definitional components of agility?

3. Does WFA mediate (link) the antecedents to ET?

4. Does WFA mediate (link) the relationship between ET and PO?

5. Does WFA moderate (change) the relationship between ET and PO?

Significance

Little is known about what effect all of the changes in the health care environment will have on nurses' performance, and there are few studies that have examined the nature of nurses' cognitive work while caring for patients (Potter, Wolf, Boxerman and Grayson, 2005). Nurses are positioned as the providers most likely to identify early stages of complications and are the first line of defense for providing interventions (Aiken, Clarke & Sloane, 2000; Havens & Aiken. 1999). However, job dissatisfaction rates are four times greater in hospital nurses than the average US worker, and dissatisfied workers have been linked to negative patient outcomes (Aiken, Clarke, Sloane, Sochalski & Silber, 2002). Understanding ET and WFA in the health care environment is extremely important because of the impact it may have on nurses' performance which can ultimately affect patient outcomes. An agile workforce can improve an organization's chances of surviving an increasingly turbulent environment (Breu, et al., 2001).

Therefore, there is a need to examine WFA in terms of ET. The reason for using the selected, established data is because this data set was taken from an appropriate sample to

answer the posed research questions. Also, the analysis of existing data should be exhausted prior to developing new measurement and initiating data collection.

Summary

This chapter has described the purpose of this research and the background on ET and WFA which are the major constructs of this study. The information gleaned from this study has the potential to impact the profession of nursing and ultimately improving patient outcomes. Chapter II will discuss the framework and the conceptualized models used for this research.

CHAPTER II: CONCEPTUAL FRAMEWORK

Introduction

Due to the complex nature of health care organizations, the following theories have informed the four alternative models that were examined in this research: Contingency Theory (CT), Socio-Technical Systems Theory (STT) and Complex Adaptive Systems Theory (CAS). Although all of the models contain an element of complexity and many similarities, there were also major differences which supported the use of all of three theories for this study.

Theory

Contingency Theory (CT)

CT examines the relationship between the internal organizational structure and the environmental demands put on these organizations. Burns and Stalker (1961) examined the internal structure and management style of four types of firms, and they discovered a lot of variation in the styles of management and structures, which led the researchers to categorize organizations as mechanistic organizations (i.e., narrow, specialized routine tasks, formal hierarchy, clearly defined authority structure, vertical communication, top down decision making and emphasis on obedience and loyalty) and organic organizations (i.e., specialized areas of knowledge, employee contributions, frequent reformulation of task responsibilities, horizontal or lateral communication, high level of mental labor, sharing of information and advice and a focus on commitment to the larger interests of the organization) (Burns & Stalker, 1961; Jaffe, 2001).

Lawrence and Lorsch's (1967) work complemented Burns and Stalker's findings. Lawrence and Lorsch examined ten firms in three variations Their research question was whether variations in the environment of three industries would correspond with differences in the organization's internal structure. Lawrence and Lorsch found that the greater the degree of certainty/stability, the greater the rigid formalized structure which supported a positive relationship between environmental certainty and the formalization of organizational structure. The way Lawrence and Lorsch (1967) measured internal structure was the degree to which the organization embraced either a rigid and formal structure or a flexible informal structure. In a stable and certain environment, organizations can develop a fixed and formalized set of practices. In an unstable and uncertain environment, organizations must constantly adapt to new conditions that require a more flexible and less formal structure. There was no one best way to organize. The success of the method used was dependent on the conditions of the environment and how the organization carried out its tasks (Jaffe, 2001; Lawrence and Lorsch, 1967).

An important dimension of an organization's environment was the degree of certainty/stability, defined by levels of competition, changes in product innovation, and the predictability of supply and demand. A highly stable and certain environment has lower levels of competition, fewer changes in product design, dependable supplies of materials and dependable demand for the product. Unstable, uncertain environments have higher levels of competition, rapid product innovation and unpredictable access to supplies and markets (Jaffe, 2001; Lawrence and Lorsch, 1967).

CT explains that the effectiveness of an organizational structure or strategy depends on the presence or absence of other factors. There is no right or wrong response. Rather, the correct structure or strategy will be dependent on the situation, circumstances and other factors that may be external to the organizations' internal environment (Jaffe, 2001).

Lawrence and Lorsch also identified another important point: Within each firm that they studied, there were three distinct subunits, pointing to a division of labor or differentiation within the organizations. Subunits, just as organizations, face varying levels of stability and certainty. Lawrence and Lorsch found that the subunits within the organization must be designed to conform to the demands of the environment with which they interact. Their findings showed that those subunits that were segmented physically and departmentally were also segmented in terms of their professional socialization, cognitive orientation and organizational interests (Jaffe, 2001).

Lawrence and Lorsch place a strong emphasis on the importance of establishing integrative mechanisms to counter differentiation and fragmentation of employees. Lawrence and Lorsch's (1967) model reflects the contradiction between a differentiation of subunit structure to match environmental demands and integration strategies designed by the organization to create solidarity among subunits. The success of an organization is contingent upon appropriate differentiation characterized by congruency between subsystems and the environment, as well as effective integration of the subsystems within an organization. The various subunits shape the sentiments, interests and motives of the staff. This creates greater social cohesion within units but generates conflict across units that can undermine the larger objectives of the organization. Integrative strategies are

designed to create greater unity among the workers within an organization (Jaffe, 2001; Lawrence and Lorsch, 1967).

Mechanistic organizations closely mirror Lawrence and Lorsch's formal structure, and organic organizations reflect Lawrence and Lorsch's informal delineation of organizational structure. Mechanistic organizations have been most successful with a stable environment, whereas organic organizations have been most successful in a less stable environment. Burns and Stalker also discovered that there wasn't one right answer as to which structure was best. The best solution was contingent on the environment (Burns & Stalker, 1961; Jaffe, 2001).

Socio-Technical Systems Theory (STT)

Socio-technical systems theory (STT) describes a method of viewing organizations emphasizing the interrelatedness of the social and technological subsystems and the relationship of the organization to the environment. The contention is that organizations are made up of people who produce products or services by using some type of technology that affects the operation. It also includes the appropriateness of the technology, as well as the actions of the people who operate the technology (Pasmore, Francis & Haldeman, 1982).

STT differs from other socially focused methods because technology is not accepted as a given. Technology and workers were studied to find ways to redesign systems for the benefit of each other. The outcome of STT was to bring together the workers and the technology in ways that improved organizational performance while enhancing the quality of work life (Pasmore, Francis & Haldeman, 1982).

The technical subsystem was made up of tools, techniques, procedures, skills, knowledge and devices used by those people (i.e., social system) to carry out the tasks of the organization. Social systems were made up of the people who work in the organization and their relationships. Technology affected the social system by shaping the human behaviors required to operate the technology. Theorists who subscribe to STT believe that the best way of directing the efforts of employees toward the goals of the organization was to identify the needs of the employees at the work place and to design the technology and the work environment to meet those needs (Pasmore, Francis & Haldeman, 1982).

Organizations use technology to increase their speed and efficiency. Technology affects the location of workers and the behaviors required to keep the system running. If the organization values the individual and provides for learning opportunities, the organization will remain adaptable. The organization becomes less adaptable when the structure becomes stable and with minimal change (Pasmore, Francis & Haldeman, 1982).

Organizations are open systems that must interact with their environment to survive. This dependents on their ability to adapt to expected environmental changes. Flexibility becomes even more important as environments become more turbulent and unpredictable. An open system perspective implies that the technological and social systems of the organization must be designed in relation to each other as well as to present and future environmental changes. The goal of a socio-technical system is met when an organization functions optimally, and only when the social and the technological systems are designed to meet the demands of the people and the environment (Pasmore, Francis & Haldeman, 1982).

Complex Adaptive Systems Theory (CAS)

A complex adaptive system (CAS) is a collection of individual agents with the ability to act in ways that are not always predicable and whose actions are interconnected. Complexity science crosses many disciplines, such as physics, biology, chemistry and more recently, health care. Complexity in a system emerges from the patterns of interactions between the elements. CAS addresses the order that emerges from a large number of interacting members of a system. Many believe that the ideas and principles of complexity science have value for human social systems as well as for physical sciences (Holden, 2005).

CAS is often referred to as chaos theory but the two are not interchangeable. Chaos theory is a subset of complexity science. Chaos theory focuses on sensitivity to initial conditions, whereas with CAS there are usually many interacting components that are not affected much by initial conditions. The robust nature of complex systems and their capacity to perform in the same way under different conditions ensures survival (Holden, 2005).

The attributes of CAS include a large number of elements interacting in a dynamic way exchanging information. These interactions are rich and non-linear with limited range. There are no over-arching frameworks that control the flow of information. Rather, CAS is an open system with feedback loops that enhance and stimulate (positive) or detract and inhibit (negative) a situation. However, both types of stimulus are necessary (Holden, 2005).

CAS operates under conditions far from equilibrium. The system is continually changing and responding to the constant flow of energy into the system. The agents are embedded in the context of their own experiences, and no one element or agent can control, know or predict actions and/or effects that are operating within the system (Holden, 2005).

The major antecedents to CAS are the individual agents, such as the people who comprise the workforce. There should be a large number of individual agents with the ability to interact. However, a large number of individuals are not essential (Holden, 2005).

Emergence, also known as adaptation, is the major consequence of CAS. Emergence is often referred to as a holistic phenomenon because the whole system is different from the sum of its parts and emergence occurs when agents interact and mutually affect each other. Emergence is enhanced by diversity because of the greater interactions and richer patterns. CAS also has been seen in crises when groups rise to the occasion to organize and adapt to the demands of a situation by developing creative, emergent behaviors (e.g., WFA) (Holden, 2005).

From a systems perspective, understanding life begins with understanding patterns or the configuration of ordered relationships. All living organisms are made up of atoms and molecules, but all living organisms are nothing except atoms and molecules. With CAS, understanding life and its processes doesn't involve individual parts; it involves parts but its focus is on how those parts fit together. It seeks to answer the question of what is the relationship, and what are the patterns? CAS is supported by systems' thinking. Therefore, there must be something else to life: something that is non-material such as an irreducible pattern of organization (Holden, 2005).

The next section will discuss the variables that were included in this research, how theory has informed these models, the questions posed and the hypothesized conceptual models. Although feedback loops have been hypothesized in CAS theory, they were not tested in this research. The hypothesized models contain the following four stages: Antecedents, ET, WFA and PO.

<div align="center">Hypothesized Conceptual Models</div>

Based on the three theories previously discussed as well as the literature, four theoretical models were developed to answer the posed questions.

<div align="center">Antecedents to Environmental Turbulence (ET)</div>

ET is a composite variable, developed by Verran, Effken, and Lamb (2001-2003), that is made up of the following constructs: 1) Perceived Environmental Uncertainty; 2) Support Service Responsiveness; 3) Accessibility; 4) Geographic Distance; and 5) Average Patients/Days. The following constructs have been hypothesized as antecedents to ET. They are composite variables developed from variables found in the IMPACT study. They are the composite variables of Complexity, Team and Workflow.

Complexity

Complexity of patient care includes instability, variability and perceived uncertainty of the environment. When these levels are high, work is considered complex. Researchers have identified a positive relationship between complexity of nursing care and several adverse patient outcomes, including medication errors (Mark, Sayler & Wan, 2000; Verran, Effken, & Lamb, 2001-2003).

Team

Many studies have supported the importance of teamwork in health care. Teamwork has been associated with higher productivity, increased employee and patient satisfaction and increase patient safety (Cox, 2001; Leppa, 1996; Rafferty, Ball & Aiken, 2001; Yun-Kyung, C. Hughes, L. & Mark, B., 2006). Team building activities have been shown to improve communication and build stronger interpersonal relationships, as well as improve satisfaction. Garrett & McDaniel (2001) found that social networks were very important during change and uncertainty. A recent study done to evaluate nursing teamwork showed that there was a significantly lower rate of patient falls, lower staff turn-over and vacancy rates and improved patient satisfaction ratings when teamwork was present (Kalisch, Curley & Stefanov, 2007).

Workflow

In 2001, there were a total of 2.7 million RNs registered to practice in the US. Of those, only 1.6 million were practicing full-time and by 2005 it was predicted that the country would need 2.6 million full-time RNs to provide safe care (New York Board of Regents, 2001). Nationwide, there have been consistent reports that hospital staffing levels

were inadequate to provide safe and effective care. Staffing has been reported to affect patient outcomes. Skill Mix (the proportion of each level of nursing staff on a particular unit), Total Nursing Hours and RN Workload have also been found to play a significant role in determining needs (Mark, Sayler & Wan, 2003).

Nurses are in a pivotal position to make quick and critical decisions positively affecting patient mortality (Haven, & Aiken, 1999; Aiken, Clarke & Sloane, 2000; Aiken, Clarke, Sloane, Sochalski & Silber, 2002; Blegan, Good & Reed, 1998; Blegan & Vaughn, 1998; Needleman, Buerhaus, Matke, Stewart & Zelevinsky, 2002). A higher percentage of RN staffing has been linked to lower mortality rates in hospitals (Shortell and Hughes, 1989).

<center>Constructs of Workforce Agility (WFA)</center>

WFA is a composite variable composed of three sub-composite variables found in the IMPACT study. They are the sub-composite variables of Competency, Collaboration and Information Systems, and the variables of Intelligence and Culture (Breu et. al., 2001).

<center>*Competency*</center>

Nurses develop knowledge and skills over time. Experienced nurses are better able to intuitively match new situations to their previous experiences to anticipate and manage workflow. By having knowledge of environmental complexities, experienced nurses are able to stay ahead of unpredictable changes in patient conditions and environmental factors (Ebright, 2004). Experience impacts a nurse's ability to recognize even the smallest changes and initiate appropriate action (Foley et al., 2002; Tilllman, Sayler, Corley & Mark, 1997).

Nursing is a knowledge profession. Multiple interruptions and disruptions, including rapid technological changes, poorly thought out IT projects and poor implementation processes, can negatively affect the cognitive functioning of nurses, creating an opportunity for errors (Ash, Berg & Coiera, 2004; IOM, 2001; IOM, 2004; Potter, et al, 2003; Potter, et al, 2005). However, the adoption of mobile Internet and palmtop devices have been found to be strongly associated with WFA, as well as access to consistent and accurate information resources (Breu et al., 2001).

Collaboration

Communication is necessary for collaboration to occur. The information communicated should be accurate, timely, relevant and open. Several studies have supported the idea that more effective communication and collaboration among health care professionals lead to better outcomes (Baggs & Schmitt, 1988; Shortell, Rousseau & Gillies, 1989).

Positive work environments generally have the same characteristics associated with professional practice environments such as empowerment, collaboration of health care workers, and participation in decision making, accountability and control over practice. Several studies have also linked satisfaction of nurses and patients to improved patient outcomes. It has been shown that the work environment also affects nurse satisfaction and the rate of turnover (Aiken, Lake, Sochalski & Sloane, 1997; Aiken & Patrician, 2000; Verran, Effken, & Lamb, 2001-2003).

Control over practice, or autonomy, is defined as the extent to which the job provides opportunity for participation in decision-making that affects patient care (Mark,

Sayler & Wan, 2003). Autonomy in decision making and empowerment are seen as key to an agile workforce (Breu, Hemingway and Strathern, 2001). Control over nursing practice has also been found to be an important attribute of professional practice and has been positively associated with nurse satisfaction and patient outcomes (Kramer & Schmalenberg, 1993; Verran, Effken, & Lamb, 2001-2003).

Information Systems

When appropriately designed and implemented, IS allows for the creation of structures that are fluid, flexible and adaptable to dynamic environments by allowing for remote access and the speed of real time access to resources improving the timeliness of necessary information. Also, IS has been assumed to positively impact Patient Outcomes (PO) (Breu, Hemingway and Strathern, 2001). However, studies have shown that technological complexities and outcomes have mixed results, as shown in the following paragraph.

Higher levels of technology innovations have been related to lower rates of adverse events (Silber and Rosenbaum, 1997). Aiken, Smith and Lake (1994) found that magnet hospitals have significantly higher technology scores than non-magnet hospitals. Al-Haider and Wan (1991) found no relationship between the number of high technology supports and PO. Whereas, Mark, Salyer and Wan (2000) found a significant positive relationship between the availability of high technology services and the implementation of professional nursing practice in hospitals. However, they also found a significant negative relationship between technology and patient satisfaction, suggesting that technology may also act as a barrier between health professionals and patients. Even though there were conflicting

findings, the implementation of technology has been proposed for improving patient safety. Therefore, it is necessary to determine the impact of technology on patient outcomes (Verran, Effken, & Lamb, 2001-2003).

Intelligence

Experience and level of education may modify nurses' perceptions of environmental uncertainty. The amount of experience of nurses have been shown to have an impact on patient outcomes (Garrett & McDaniel, 2001). Novice nurses haven't had the experience and the time to assimilate their experiences. They are also not attuned to identifying subtle changes in patient conditions. This is not because they are not intelligent; it is because they don't have lived experiences to apply to the situation (Benner, 1984; Ebright, et al, 2003; Ebright, 2004; Foley, Kee, Minick, Jennings, 2002).

The effects of RN educational preparation on patient outcomes has been difficult to access. Sayler (1995) reported that staff nurses with higher education were less tolerant of ambiguity and concluded that more education has a negative impact on the results of a self-rated evaluation of skill performance. However, nurses with a higher level of education were more self critical. More research in this area needs to be conducted.

The educational level of nursing staff may have an impact on patient outcomes (Aiken, et al, 2003; Knaus, 1986). Mortality has been reported to be less than predicted in intensive care units where there were masters' prepared clinical specialists (Knaus, 1986), and hospitals with a higher number of nurses prepared at the baccalaureate level or higher saw a lower mortality and failure to rescue rates (Aiken, et al, 2003). Organizational research has found that the higher the education level of the staff, the higher their ability

was to participate in autonomous decision making (Verran, Effken, & Lamb, 2001-2003).

For the purposes of this study, education is defined as the average education of the

collective nursing staff on a unit.

Culture

Group culture is defined by risk-taking behaviors, innovation, good team work and

participation with the goal of supporting a climate of quality. Shortell et al. (1995) found

that hospitals with an identified group culture had greater implementation of quality

improvement efforts, shorter lengths of stay, lower costs, and greater perceived PO

(Verran, Effken, & Lamb, 2001-2003).

Patient care units have unique cultures all of their own that may differ significantly

from the culture of the organization. Therefore, it is important to address culture at both the

organizational as well as unit level.

Patient Outcomes (PO)

Two variables were used to measure Patient Outcomes (PO): Medication Errors

(objective measure) and the patient's Perception of Being Cared for (subjective measure).

Medication Errors

Medication administration is a highly complex process involving the selection of

the correct drug, dose, route, patient and time of the drug while also remaining alert to

prescribing and/or dispensing errors (IOM, 2004). Medication administration is a well

documented nursing function that crosses all health care settings. Medication

administration is a high frequency activity that involves a threat to patient safety (IOM,

2004; Lin, Vicente & Doyle, 2001). More than 770,000 people were estimated to suffer

injury or death in hospitals as a result of medication errors (IOM, 2004). One of the most commonly used nurse-sensitive, safety-related outcome measures is reported Medication Errors (Verran, Effken, & Lamb, 2001-2003).

There are many factors which may impact the commission of medication errors. One factor is the increasing number of medications available, which changes daily, compounded by nursings responsibility for needing to know the drug action, side effects and correct dosage. Lack of mathematical proficiency of nurses is another factor linked to medication errors. Human factor and ergonomic experts estimated that humans will make simple arithmetic errors at a rate of 3 per 100 under normal, calm conditions. However, nurses must calculate drugs under stressful conditions and time constraints, which increase the likelihood of errors. Stress, interruptions, fatigue, over-time, poor communication, lack of patient information, missing medications, complex drug administration systems and problems with IV delivery and infusion pumps also increase the likelihood of medication errors (IOM, 2004).

It has been estimated that medication errors account for over 7,000 deaths annually (Bates, Spell, Cullen, et. al, 1997; IOM, 2001). It was also reported that two out of every 100 patients admitted to the hospital experienced a preventable medication error, costing an average increase in hospital costs of $4,700 per admission. That is approximately $2.8 million annually for a 700 bed hospital, or $2 billion dollars nationally (IOM, 2001). In the literature, many safety-related outcome measures were proposed to improve patient safety, but not all measures were sensitive to changes in health care.

Perception of Being Well Cared For

The Patient's Perception of Being Well Cared For is considered an important aspect of patient satisfaction. Satisfaction with care was the method of choice for obtaining patients' opinions about their care. It is thought to be a desirable health care outcome (McMillen, 1999). The opinions of the patients receiving the care are necessary to learn about how well health care organizations are functioning (Donabedian, 1988). For these reasons, patient satisfaction was used as an outcome measure of the effectiveness of care and the effects of the changes in care delivery (Verran, Effken, & Lamb, 2001-2003).

Theory Informing Research

CT, STT and CAS inform all four models tested. More specifically, CT informs the concept of ET which was used in all four models. ET created an unstable and uncertain environment wherein changes coming from the internal and/or external environment produced unanticipated consequences affecting the internal environment (Cameron, Kim and Whetton 1987; Jabur, 1999; Pfeffer & Salancik, 1978; Sayler, 1995; Tilllman, Sayler, Corley and Mark, 1997).

CT informs WFA by supporting that organizations need to be more flexible and adaptable to new conditions within a less formalized structure. CT specifically addresses the antecedent of Team supporting the use of unit level and organizational level data. Also, culture was supported by the concept of subunits shaping sentiments, interests and motives of the workers. CT speaks to the external environment which has the potential to affect the internal environment affecting patient outcomes. Patient outcomes were informed by CT

because it supported the idea of success being dependent on the environment and how patients were cared for. It also supported the idea of perception informing reality.

STT informed all four models by supporting the relationships between the constructs of ET, WFA and PO by focusing on the interrelatedness of the social (i.e., nurses) and technological subsystems and the relationship of the organization to the environment. STT has similarities to CT in that it has an elemental focus of environment. However, STT specifically addresses adaptability of the workforce by addressing the value of the individual and learning opportunities for continued growth which determines adaptability of an organization (i.e., WFA). STT also supports the idea of perception informing reality.

CAS informs all four models by supporting ET, but more interestingly, it strongly informs the use of WFA as an intervention when studying ET. CAS's premise is based on nonlinear dynamics, which strongly supports the concept of recursive models. CAS' focus is on the collection of individuals and their ability to act in ways that are not always predictable but whose actions are interconnected. CAS addresses the open system with multiple feedback loops which can enhance or inhibit work group factors (i.e., Communication, Collaboration, Culture, Intelligence, IS, Complexity, Workflow and Team). CAS supports the idea of perception being embedded in the context of histories. WFA, as an intervention, addresses the response of groups and their ability to adapt to the demands of the situation or to continue functioning in the same pattern.

Based upon these theories, four research models were developed to examine the relationships between Environmental Turbulence (ET), Workforce Agility (WFA) and

Patient Outcomes (PO). In addition, the models were designed to address the identification of the antecedents to ET as well as the development of the constructs which define WFA.

There were many possibilities of feedback loops when discussing ET, WFA and PO. However, for the purposes of this study, only linear models were addressed because that was the available data for this study, and inclusion of feedback loops would have been overwhelming but should be considered for future research.

Research Questions

Nothing was found in the literature to explain the relationships between ET, WFA and PO. Therefore the following four models were proposed as hypotheses to define and explain the relationships. The following questions were addressed:

1. What unit characteristics are antecedents to ET? (Figure 1)

2. Can a composite variable describing WFA be developed based upon the definitional components of ability? (Figure 1)

3. Does WFA mediate the antecedents to ET? (Figure 2)

4. Does WFA mediate the relationship between ET and PO? (Figure 3)

5. Does WFA moderate the relationship between ET and PO? (Figure 4)

FIGURE 1: MODEL 1
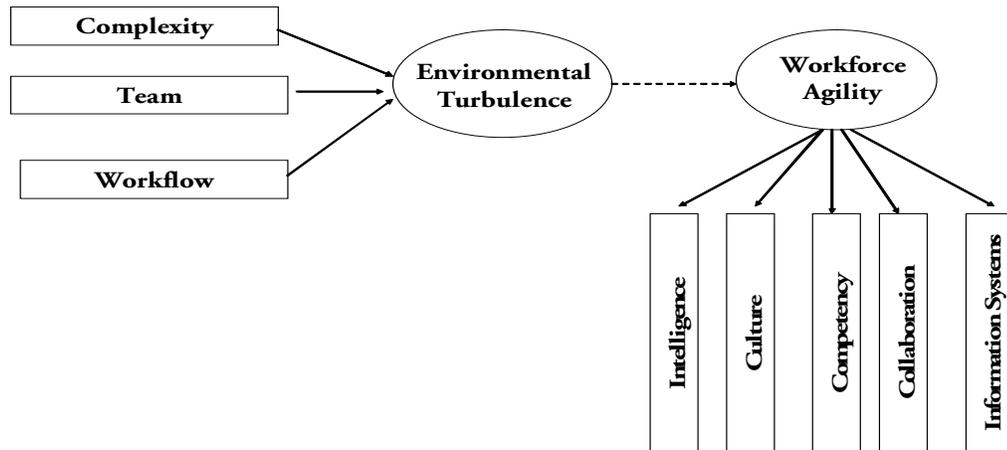
Figure 1 Research Model 1
Antecedents to ET and Indicators of WFA

Model 1 measures which unit characteristics are antecedents to ET and

hypothesizes that the antecedents to ET are the composite variables of Complexity, Team

and Workflow. It was also hypothesized that a variable for WFA could be developed based

upon the definitional components of agility using comparable constructs for Intelligence,

Culture, Competency, Collaboration and Information Systems.

FIGURE 2: MODEL 2
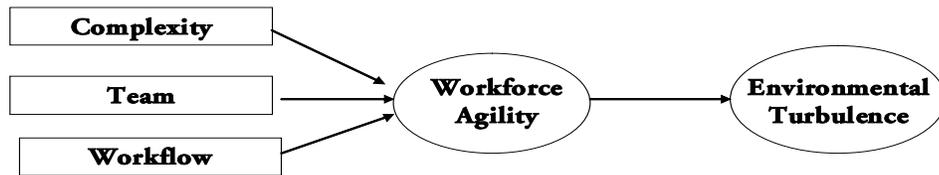
Figure 2 Research Model 2
WFA as a mediator for ET antecedents to ET

Model 2 tested the relationship between the antecedents to ET mediated by WFA. In this model, WFA could link the antecedents to ET. With this conceptual model, if WFA was a mediator, then more attention should be given to improving WFA, thereby diffusing and/or decreasing ET.

FIGURE 3: MODEL 3
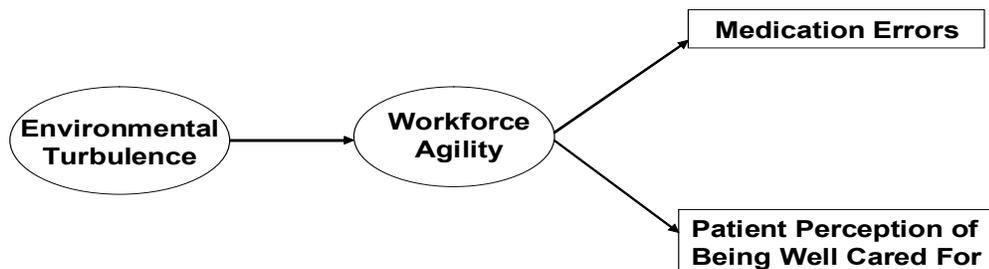
Figure 3. Research Model 3: Workforce Agility as a Mediator between Environmental Turbulence and Patient Outcomes

Model 3 is testing whether WFA is a mediator between ET and PO. WFA could

link ET to PO. With this conceptual model, if WFA was found to be a mediator, then more

attention should be given to improving WFA thereby diffusing and/or decreasing ET.

FIGURE 4: MODEL 4
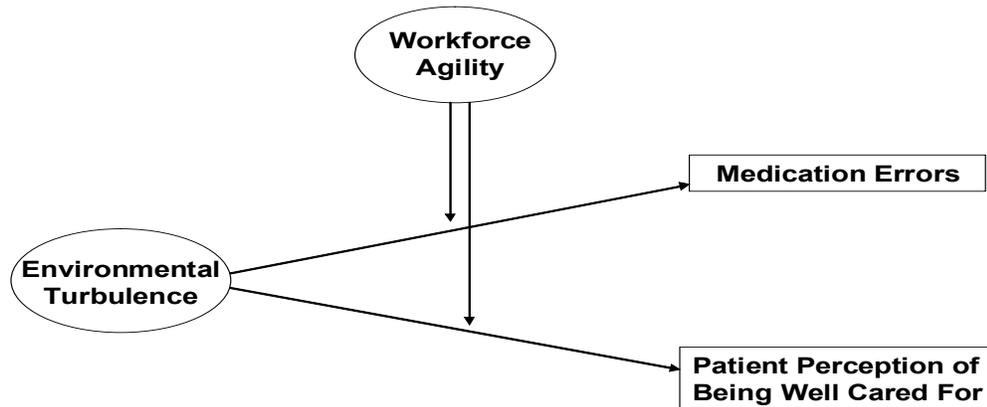
Figure 4: Research Model 4: Workforce Agility as a moderator between Environmental Turbulence and Patient Outcomes.

Model 4 suggests that WFA moderates (changes) the relationship between ET and PO. If the perception of ET could be changed prior to an error or negative perception of care, then patient outcomes may improve.

Summary

This chapter has given an overview of the theories used to inform this study, and it has explained the use of specific variables used in the models. At this point, there was nothing in the literature to explain the relationships between ET, WFA and PO. By identifying the antecedents to ET, organizations would be able to assess for the potential of ET, and develop and implement plans to diffuse and/or divert ET. By validating the variables for WFA, a means for measuring the level of WFA presented at a unit and organizational level could be developed. This could provide opportunities for improving

WFA thereby improving PO. Chapter III will discuss the methodology used for this

research.

CHAPTER III: METHODOLOGY

Introduction

The purpose of this chapter is to provide an overview of the primary IMPACT study (Verran et al., 2001-2003) and the design of the current research.

Methods

Overview of the Primary IMPACT Study

The Impact of Unit Characteristics on Patient Outcomes (IMPACT) (Verran, Effken, & Lamb, 2001-2003) was the primary study from which data used for secondary analysis was obtained. The IMPACT study was funded by the Agency for Healthcare Research and Quality (AHRQ) in response to a request for proposals designed to assess relationships among working conditions and patient safety. Collection procedures varied depending on the level of data collection which was staff, patients or the unit. Although the IMPACT Study and this study were not testing the same models, the measures remained the same. The instruments used in the IMPACT Study were tested for reliability and validity at the individual level and group level.

Setting and Sample of IMPACT Study

The setting for the IMPACT Study was acute care hospitals in the Southwestern region of the United States. For the IMPACT study, the sample consisted of patient care units from teaching and non-teaching hospitals. Subjects consisted of staff members who were employed on the patient care units such as registered nurses, patient care technicians, licensed practical nurses, physicians, physical therapists, occupational, speech and respiratory therapists, case managers, clergy, dietitians, pharmacists and social workers.

Individual level data were aggregated to the level of the patient care unit (Brewer, 2002; Verran, Effken, & Lamb, 2001-2003).

A patient care unit was defined as a workgroup with twenty-four hour responsibilities for inpatients in the acute care setting. Adult medical-surgical units were sampled. Critical care, maternal/child and psychiatric units were excluded from this study because their patient populations were expected to be at a different risk for the outcomes of the IMPACT study. Limiting the sample to adults on medical and/or surgical units helped to control for differences in patient acuity. It also helped to avoid misattribution of poor outcomes to relationships with structure or process variables rather than the relationships to patient characteristics (Brewer, 2002; Verran, Effken, & Lamb, 2001-2003).

Staff Level Data Collection

Patient care units were recruited through the chief nurse executives at each of the selected hospitals. Patient care managers were interviewed for names of staff eligible to participate. All eligible staff received a disclaimer informing them of the purpose of the study. It also informed them that the participation was strictly voluntary and encouraged participation. Information regarding confidentiality and how the study results would be disseminated was also shared with the prospective participants. Included with the letter were the survey materials. Completion and return of the survey implied consent of the participant (Brewer, 2002; Verran, Effken & Lamb, 2001-2003).

All staff members were employed on the selected units for a minimum of three months in order to be included in this study. Patient Care Unit Staff was defined as all individuals who were assigned to the patient care unit and had direct patient care

responsibilities. A special effort was made to include subjects from other health care disciplines in order to get a broad and multidisciplinary view of work team effectiveness (Brewer, 2002; Verran, Effken & Lamb, 2001-2003).

A survey was given to each person identified by the selected managers. All staff data were collected through completion of questionnaires. The total nursing staff assigned to patient care units who responded to the questionnaires was 454 RNs, 250 Patient Care Technicians, 43 Licensed Practical Nurses and 32 Ward Clerks. Additional participants included physicians and support personnel from other disciplines (Brewer, 2002; Verran, Effken & Lamb, 2001-2003).

Each survey was stamped with a unit number but no other means of identification could be tied to individual participants. A master list of participants was maintained in the research office. Each survey included an envelope with a return address to the IMPACT study. Subjects were asked to place their completed surveys in a secure box on each unit. Personnel from the IMPACT study collected the completed surveys at least once a week. Participants who had not completed a survey within four weeks were sent a second survey. For those who did not respond after a second attempt, a third and final attempt was made (Brewer, 2002; Verran, Effken & Lamb, 2001-2003).

The patient care unit was the unit of analysis for this study. Individual survey responses were aggregated to reflect values for the patient care unit. A unit level response rate of a minimum of 40% was required for inclusion in this study. Five patient care units were dropped from the study after failing to reach the 40% criterion, leaving 32 units which

reflected 867 staff from 10 hospitals for the final analysis. All tools used for data collection can be found in Appendix A.

Unit and Hospital Level Data Collection

Hospital and unit level data were limited to those already collected for administrative purposes. All patient safety and resource measures were collected for a six month period: the three months at the beginning of staff data collection and three months after. Then, this data was averaged to reflect a monthly rate. There was an assumption made that these types of outcomes did not fluctuate highly from month to month. However, there might be some variation depending on types of patients admitted to the unit during the month. The data collection for six months with subsequent averaging was intended to smooth out any fluctuations and be more reflective of the unit's normal outcomes. Unit managers and hospital quality managers were asked to provide the data for the unit level and hospital level outcomes (Brewer, 2002; Verran, Effken & Lamb, 2001-2003)

Patient Level Data Collection

Discharged patients were randomly selected to complete the quality outcome measures for the study which included the Perception of Being Well Cared for Survey. Randomization was maintained by selecting random days for each patient care unit. All of the selected discharged patients were contacted to complete the instrument prior to leaving the patient care unit. However, some patients were surveyed by telephone after they had been discharged. This resulted in a total of 1179 patients or 2% of the total discharges during the six months of data collection. A comparison was made of the discharged patients' gender, age and length of hospital stay and showed no substantial differences

from hospital reported unit data making the database representative of the total discharged patients.

The patient data used for this study was taken from the Satisfaction Surveys on three subscales. The reliability and validity measures for the instrument in the IMPACT study are shown in Table 1. Although aggregation of data for use of the mean as a measure of the group was deemed appropriate from the r_{wg} results, a compilation model was used for all outcomes. The percentage of patients who were discharged from the nursing unit who met a predetermined standard was computed for each nursing unit. For the Well Cared for Scale, the standard was a score of 3.5 or higher on the subscale.

TABLE 1. Reliability and Validity of Well Cared For (WCF) Subscales

Scale	Reli-ability	Validity		ICC	p-value	r_{wg}
		Percent explained	F. Loading			
WCF Satisfaction in general *(n=6)	.90	.67	≥.76	0.400	0.016	0.70
WCF Caring *(n=5)	.83	.59	≥.71	0.536	0.000	0.80
WCF Individual Needs *(n=4)	.76	.58	≥.73	0.503	0.001	0.76

*(N) represents number of items used from the scale

Secondary Analysis: The Relationship between ET, WFA and PO

Research Design

This study was designed to test the relationship between ET, WFA and PO using the IMPACT data set (Verran, Effken & Lamb, 2001-2003). The IMPACT data was a good fit for this study because it has an appropriate sample, and has data available for answering

the questions posed by this study. The IMPACT study data was reanalyzed in order to answer different questions than the primary study.

Secondary Analysis

Secondary analysis deals with research in which the investigator analyzes previously collected data. There is no need to recruit a sample, design a study, find an appropriate instrument or gather data. Variables that were unanalyzed in the initial investigation are targets for further research. Different relationships among variables can be explored in later uses of the data. Another possibility for using secondary analysis is a change in the unit of analysis such as aggregating data from an individual to unit level (Polit & Hungler, 1987).

Thus, expediency is the greatest advantage of secondary analysis. Research studies usually produce more data than could be analyzed at one time, and existing data sets offer an economical and efficient means of testing hypotheses (Polit and Hungler, 1987).

Sample

Only the data collected from Registered Nurses and discharged patients were used for the secondary analysis because I was primarily interested in looking at the nursing unit. The intent was to study how the RNs viewed ET and WFA and the impact this had on PO. The total RN staff assigned to patient care units who responded to the questionnaires was N=454 and an N=1179 for discharged patients.

Methodology for Secondary Analysis

All individual RN data were extracted from by extracting all RN data from the data set and aggregated to the unit level. Individual scale reliability was confirmed and factor analysis to create the ET composite was rerun for all scales using only RN data.

Group level ICC and r_{wgs} were examined to assure use at a group level. The results of reliability and validity using only RN data at both the individual and group level are shown in Table 2. Next, new variables for Technology, Experience and Education were created using selected variables from the IMPACT study.

TABLE 2. Reliability for Three Subscales Using RN Data

Scale	Reliability	ICC(2)	Sig.	r_{wg}
Turbulence Components				
Accessibility	.64	.75	<.001	.91
Perceived Environmental Uncertainty	.80	.84	<.001	.76*
Responsiveness	.90	.53	.001	.94
Distance	N/A		N/A	.67
Team Components				
Team Relationships	.91	.33	.045	.85
Team Communication	.92	.51	.455	.93
Workforce Agility Components				
Staff Satisfaction	.85	.69	<.001	.92
Nursing Communication	.85	.51	.001	.98
Self-Regulation	.82	.45	.006	.97
Control Over Nursing Practice	.93	.68	<.001	.99
Group Culture	.76	.74	<.001	.55

Selected Variables for Defining ET

Turbulence was a latent construct in the IMPACT (2001-2003) study, which

represented environmental difficulties that interfered with care on a patient care unit. The

construct of ET for this research was the same concept of Turbulence from the IMPACT

study. The construct of Turbulence was made up of five concepts: the number of patients

per day on a unit, accessibility of needed resources, distance required to access resources,

responsiveness of support services and perceived environmental uncertainty (Verran, et al.,

2001-2003). However, the Turbulence composite was recalculated based only upon RN

responses. In addition, reliability and validity of the measures making up the composite

were recalculated with data from RNs.

Distance and accessibility variables were created for the IMPACT study, and used

for this study, provided indicators of the units' physical environment. Accessibility was an

indication of the availability of equipment, supplies and other aspects that allowed smooth

operations. Accessibility was defined as the perception of time nursing staff must leave the

unit to obtain materials or perform patient care. Data for these variables were derived from

the Staff Survey, items 25-29 (Verran et al., 2001-2003).

Distance was a single-item measure created for the IMPACT study and used for

this study. Distance was defined as an estimate of the geographic distance staff must cover

to complete their assignment. The item was part of the Staff Survey (question 30) and was

created for this study (Verran et al., 2001-2003).

Responsiveness of Support Staff was defined as the degree that support departments

responded to patient care needs. Responsiveness of Support Staff was created for the

IMPACT study, and used for this study. The indicator was developed by Mark et al. (2000) and was included as part of the Staff Survey, items 63-89.

Perceived Environmental Uncertainty, created for the IMPACT study and used for this study, was defined as the degree to which the environment was stable or unstable, homogeneous or heterogeneous, concentrated or dispersed; simple or complex (Verran et al., 2001-2003). Perceived Environmental Uncertainty was measured by a scale developed by Salyer (1996) and was included in the Staff Survey, items 49-62.

Patients per day was created for the IMPACT study and used for this study. Patients per day was defined as the average number of patients hospitalized on a nursing unit in a 24-hour period and was computed as the unit occupancy times the number of beds on the unit, averaged over three months. The item was part of the Information Systems Survey (Verran et al., 2001-2003).

<center>Creation of Turbulence as a Latent Composite Variable</center>

Once RN responses were aggregated to the unit level for all five scales in the ET composite, a factor analysis using PC extraction on the scale measures from the 32 units forced them to one factor. Factor loadings for ET composite are shown in Table 3 for the RN sample of this study, as well as for the staff sample used in the IMPACT study. Essentially, there were no significant differences in the weights for the two samples. These weights were used to form a single measure of ET for each unit by computing the product of each measure and its loading and then summing the results.

TABLE 3. Comparison of Factor Scores for ET Composite with RNs and all Staff

Factor Scores for ET Composite	RN	All
Pt/Day	.46	.47
Accessibility	-.65	-.62
Environmental Uncertainty	.86	.85
Responsiveness of Support	-.77	-.86
Distance	-.64	-.56
Total Explained Variance	47%	46%

Antecedents to ET

Antecedents to ET were comprised of three sub-composite variables: Complexity, Team and Workflow (refer to Table 4). Measures for Complexity and Workflow were obtained during the IMPACT study from hospital information technology staff. Individual assessment of team measures were obtained from the Staff Survey and then aggregated to the unit level.

TABLE 4. Antecedents to ET

Complexity	Team	Workflow
% >than 75	Team Relationship	Skill Mix
Average # of ICD-9 codes	Team Communication	Nursing Hours
Percentage of high complexity	Permanency of Team Members	Nursing Workload
	Perceived number of Team members	

Complexity

Complexity was defined as the percent of patients on the patient care unit perceived as highly complex. Percent Elderly was defined as the percent of patients on the unit older than 75 years of age and was a six month average. Data were originally collected for the IMPACT Study via the Information Systems Survey. The Average Number of ICD-9 Codes was defined as the average number of ICD-9 codes per patient admitted to the patient care unit and was considered a proxy for co-morbidities in both studies. A six month average was computed from the data collected as part of the Information Systems Survey (Verran et al., 2001-2003).

Team

Perceived number of Team Members was a question asked on the Staff Questionnaire. Team Communication was measured as three dimensions of communication on the Relational Coordination Scale. These dimensions measured the timeliness, frequency and accuracy of communication among dietitians, physicians, pharmacists, social workers, and therapists for a total of 15 items. Cronbach's alpha for the scale was reported as .95 in the IMPACT study. Team Relationships were measured by 21 items on the Relational Coordination Scalethat measured how well the team worked together to solve problems, shared goals among all team members and respected each other (Verran et al., 2001-2003).

Workflow

Workflow was a composite variable that represented the overall unit nursing staff available to provide care and was comprised of Nursing Hours per Patient Day, Nursing

Workload and Skill Mix. Nursing Hours per Patient Day was defined as the regular paid hours for all unit based staff divided by the number of patient days and was averaged over three months. Nursing Workload was defined as the number of patient days divided by the actual RN FTEs and was averaged over three months and represented the number of patient days for which each RN was responsible. Skill Mix was defined as the percentage of RNs of the total unit staff averaged over a three month period. All staffing variables were obtained initially from the Managers Survey (Verran et al., 2001-2003). The Workflow index for this study equates to the Staffing composite used in the IMPACT study. Therefore, this composite was not specifically created for the current research.

Constructs of Workforce Agility

The comparable constructs identified for defining WFA for this study were composed of variables found in the IMPACT study (Refer to Table 5).

TABLE 5. Constructs of WFA

Collaboration	Competency	Information System	Intelligence	Culture
Staff Satisfaction	Experience	Technology of care	Level of Education	Group Culture
Communication	*Length of Time in Hospital	Lifecycle		
Self-regulation				
Control over Practice	*Length of Time on Unit			

Collaboration

Collaboration was a composite variable consisting of Control over Practice, Staff Satisfaction, Communication and Self Regulation. Control over Practice, frequently referred to as autonomy, was defined as the extent to which the job provided opportunities for participation and discretion in decision-making about practice and was measured by a scale created by Verran et al (1994) and was shown on the Staff Survey, items 90-112.

Staff Satisfaction was defined as the overall satisfaction with one's position and was measured by a five item scale (Delaney & Huber, 1996) included as items 20-24 on the Staff Survey.

Communication was defined as interactions that enable the knowledge and skills of all nursing staff to influence patient care and was measured on the Staff Survey, items 33-35. Self-regulation was defined as the perception of the degree of self-directed work teams of interdependent workers and was included in the Staff Survey, items 36-48.

Competency

Competency was defined as experience, i.e., the length of time the RN worked (a) at that hospital, and (b) on that Unit (Verran, et al, 2001-2003).

Information System

Information System was composed of Technology of Care and Lifecycle. Technology of Care was defined as the presence of 11 computer assisted aids available on the patient care unit that had been identified as important for reducing errors. Lifecycle was defined as the percent increase in admissions and indicated hospital growth or decline. The

items were obtained from Delaney and Huber (1996) and were included in the Manager

Survey (Verran, et al., 2001-2003).

Intelligence

Intelligence was defined as the percentage of RNs assigned to a patient care unit

with a Baccalaureate or higher degree (Verran et al., 2001-2003).

Culture

Culture was a unit level variable. Staff input made up the culture data. Group

Culture was defined by participation and teamwork. Culture variables were measured at the

staff level. In the IMPACT study, they were measured at the hospital level by managers.

Variables Defining Patient Outcomes (PO)

Patient Outcomes (PO) were defined as the two variables of Medication Errors and

Perception of Being Cared For. These variables were the same variables used in the

IMPACT study (Verran et al., 2001-2003). Medication Errors was defined as the number of

all reported medication errors per 1000 patient days averaged over three months. Data were

obtained from quality improvement departments via the Quality Improvement scale

(Verran et al., 2001-2003).

As in the IMPACT Study, patients' Perception of Being Well Cared For was

measured by a scale consisting of three subscales: General Satisfaction, Caring Satisfaction

and Individual Satisfaction (refer to Table 1 for Reliability and Validity results).

Data Analysis

The plan for data analysis will be discussed by each research question for this study. Initially, composites were formed for antecedents to ET using the procedures as described for creating the Turbulence composite.

For question 1 (What unit characteristics are antecedents to ET?) (Model 1): Causal modeling via path analysis was conducted to answer this question. Causal modeling is a statistically based regression process that is best used to examine the predictability of patient risk characteristics, organizational characteristics and unit characteristics on patient safety and quality outcomes (Trochim, 2001).

To answer question 2 (Can a composite variable of WFA be developed based upon the definitional components of agility?) (Model 1): Factor Analysis was used to develop a composite variable for WFA, as described for the development of the Turbulence composite variable for the IMPACT study (Verran et al., 2001-2003).

Regression analyses were conducted to answer questions 3-5. Regression analysis is a general statistical analysis that enables the researcher to model relationships in data and test for treatment effects (Trochim, 2001). Multiple regressions seek to predict an outcome from several predictors and are recommended when using moderator or mediator variables (Field, 2000).

Questions 3-5 included the use of either a moderator or mediator variable. Moderators and mediators are third variables that affect the association between an independent variable and an outcome variable offering a more exact description of the relationship. Moderators explain the circumstances that cause a weak association between

two variables that were expected to have a strong relationship. Mediators provide additional information about why or how two variables are strongly associated. A mediator is predicted by the independent variable, and a moderator is a separate independent variable. The decision about whether a variable is a moderator or mediator should be based on theory and the conceptual framework guiding the study (Baron & Kenny, 1986; Bennett, 2000).

For questions 3 (Does WFA mediate the antecedents to ET?) and 4 (Does Workforce Agility mediate the relationship between ET and patient outcomes?), a mediator variable was posited. A mediator is only tested when there is a significant direct effect between the independent variable and the outcome. However, there is the possibility that a mediator conceptually occurs between the two variables. Mediators exist when: (a) a variation in the independent variable predicts variations in the mediator variable, (b) variation in the mediator variable predicts variations in the outcome variable and (c) when the associations in (a) and (b) are controlled for in the model, the direct relationship between the independent variable and the outcome become insignificant (Baron & Kenny, 1986; Bennett, 2000).

For question 5 (Does Workforce Agility moderate the relationship between ET and PO?) (Model 4), a moderator variable was posited. The moderator interacts with the independent variable so that the independent variable's association with the outcome is stronger or weaker. The association of the independent variable with the outcome variable depends on the level of the moderator. A moderator effect is said to have occurred when the direction or the magnitude of the correlation changes. A basic moderator effect can be

represented as an interaction between an independent variable and a factor that specifies the appropriate conditions for its operation. The statistical analysis must measure and test the differential effect of the independent variable on the dependent variable as a function of the moderator. The strategy is to test for an interaction using hierarchical multiple regression analysis (Bennett, 2000).

In the first step of the regression, the independent variables (including the moderator) are entered into the model as predictors of the outcome variable. The independent variables do not have to be significant predicators of the outcome in order to test for an interaction in the next step. In a separate step, an interaction term is entered. If the interaction term explains a statistically significant amount of variance in the dependent variable, a moderator effect is present. The interaction term represents a joint relationship between the two independent variables and this relationship accounts for additional variance in the outcome beyond that explained by a single variable. Several different regression slopes represent the association, rather than just one and the association of the independent variable with the outcome variable depends on the value of the moderator (Bennett, 2000).

A hierarchical regression, in which the interaction term is entered at its own step, allows the researcher to see the main effects of the independent variables in the earlier steps separately from the effect of the moderator in the final step. It is also possible to use a regression model in which all variables, including the interaction term, entered in a single step. In this situation, the significance of the semi partial correlation of the interaction term will show if a moderator effect is present (Bennett, 2000).

Protection of Human Subjects

Human Subjects approval was obtained from the University of Arizona Human Subjects Review Committee for the secondary analysis. Previously, separate human subjects and access procedures were completed by the researchers for the original IMPACT study with the University of Arizona Human Subjects Review committee, as well as each hospital that participated in this study.

The Human Subjects approval for this secondary analysis research is included as Appendix B. Approval from the Principal Investigator for use of the data in Appendix C.

Summary

This chapter has discussed the methodology employed for the primary IMPACT Study as well as for the current study. The Constructs for ET, the Antecedents to ET, WFA and PO were defined. Methods used to test the proposed models were discussed. Chapter IV will discuss the results of the data analysis.

CHAPTER IV: RESULTS

Introduction

The purpose of this chapter is to describe the results of the secondary analysis of this study.

Results

Sample

Individual

Overall, the total size for this sample was 454 registered nurses (RN). The average participant was approximately 44 years old, white and female, worked full time, and had either an AD or BS degree. Refer to Table 6 for demographic details of this sample. The total number of discharged patients for this sample was 1179.

Nursing Unit

The sample consisted of 32 nursing or patient units. All units were designated for the care of adult patients with non-critical medical, surgical, combined medical/surgical or acute rehabilitation.

All of the variables used for this study were described in Chapters 2 and 3. All instruments used in the primary study had shown reliability. For the purposes of this study, instrument reliabilities were reassessed using only the RN data (refer to Chapter 3).

TABLE 6. Characteristics of Registered Nurses (RNs)

Sample Total	454
Job Title	RN
Mean Age (SD)	43.7 (10.5)
Female	419 (92.0)
Male	32 (7.0)
Ethnicity:	
White	366 (80.6)
Hispanic	34 (7.5)
Native American	5 (1.1)
Black/African American	6 (1.3)
Asian	25 (5.5)
Other	11 (2.4)
Employment Status	
Full Time	335 (73.8)
Part Time	79 (17.4)
Per Diem	39 (8.6)
Shift	
Days-12 hours	218 (48.0)
Nights– 12 hours	162 (35.7)
Days- 8 hours	30 (6.6)
Evenings- 8 hours	24 (5.3)
Nights- 8 hours	6 (1.3)
Varied	6 (1.3)
Highest Level of Education	
Associate degree	196 (43.2)
Baccalaureate degree	166 (36.6)
Diploma	40 (8.8)
Master's degree	22 (4.8)
Doctorate	1 (0.2)
Note: The values in parenthesis represent proportion within each category. The total may not add up to 100% due to missing data.	

Preliminary Data Preparation

Composite variables were created for Complexity, Team and Workflow prior to

testing question 1. Factor Analysis (FA) with principle component extraction was applied

and forced to one factor. There was no rotation.

For the Antecedent Complexity, Percent of Elderly loaded at .83 and ICD 9 Codes loaded at .83 with an explained variance of 69%. The Percentage of High Complexity Patients loaded below .40 and was dropped from the composite.

For the Antecedent Workflow, RN workload loaded at -.94; Nursing Hours loaded at .77; and Skill Mix loaded at .73 with an explained variance of 67%. RN workload was a negative indicator of staffing. Factor loadings and the percent of variance replicated those for the composite variable of Staffing in the IMPACT study.

For the Antecedent Team, Permanency of Team Members loaded at -.56; Team Relations loaded at .91; and Team Communication loaded at .67 with an explained variance of 53%. The Perceived Number of Team Members did not adequately load and was removed. The negative loading of Permanency of Team Members fit with the factor because the higher the score on the variable the more the team members changed. Sub-composite variables were created by multiplying the actual score on each variable for the unit by the factor loading. Then, the results were summed.

In summary, three composite variables representing the Antecedents to ET were successfully developed through Factor Analysis. Not all of the anticipated variables loaded. However, the remaining variables appropriately loaded (refer to Table 7).

TABLE 7. Composite Variables of Antecedents of ET

Sub-composite Variable	Variable Content	Component
Complexity	Percent elderly	.83
	ICD 9 Code	.83
	% High Complexity	-
Explained Variance		69%
Team	Permanency of Team	-.56
	Team Relations	.91
	Communication	.67
	Perceived Team members	-
Explained Variance		53%
Workflow	Workload	-.94
	Nursing hours	.77
	Skill Mix	.73
Explained Variance		67%

Research Question 1 (Model 1)

1. What unit characteristics are Antecedents to the perception of ET?

To answer question 1, a multiple regression using stepwise entry with ET as the dependent variable and a p=.05 was applied. The results showed that none of the variables entered the regression. Therefore a forced entry was used with the results shown in Table 8.

TABLE 8. Independent Variables and Probability

Independent Variable	Beta	Probability
Complexity	-.29	.13
Workflow	-.01	.95
Team	-.30	.09

The regression of ET on the Antecedent composites had an R^2=.16. Because of the magnitude of Beta weights, the regression was rerun using only Complexity and Team as independent variables. A significance level of .15 was accepted for this exploratory work.

Results indicated an R^2 of .16 (p = .11). Beta weights and probabilities for Complexity and Team remained the same.

The findings indicate preliminarily that Complexity and Team functioning were negative indicators of ET. Negative results indicated that the greater Complexity the lower the ET (Beta= -.29) and the greater the Team (Beta= -.30) the lower the ET. The significance of the regression (R^2= .16) was very low (refer to Table 9).

TABLE 9. Turbulence Reliability and Validity for RNs

Turbulence using RNs only	Beta	R^2	Sig.
Complex	-.29		
Team	-.30		
Workflow	-.01		
		.16	.17

Research Question 2 (Model 1)

2. Can a composite variable of WFA be developed based upon the definitional components of agility?

To answer question 2, two steps were taken. The first step was to create sub-composite variables; and the second step was to create a composite variable for WFA. Sub-composite variables for Collaboration and Competency were created. Variables of Intelligence, and Culture were single variables; therefore no sub-composites for these variables were created. A sub-composite for IS was attempted but, as discussed later, it resulted in the inclusion of only one variable.

Sub-Composite Variables

The sub-composite variables of Collaboration and Competency were created using the same method used to create Antecedents of ET, which was described previously. Factor

analysis with principle component extraction was used forcing one factor. For the

Collaboration Composite, Nursing Communication loaded at. 69; RN Satisfaction loaded at

.86; Control over Nursing Practice loaded at .89; and Team Self Regulation loaded at .76.

There was an explained variance of 65% (refer to Table 10).

TABLE 10. Sub-composite Variable for Collaboration and Content

Sub-composite Variable	Content	Component
Collaboration	Nursing Communication	.69
	Staff Satisfaction	.86
	Control over Nursing Practice	.89
	Self Regulation	.76
Explained Variance		65%

For the Competency sub-composite, Less than one year working in a hospital

loaded at -.63; Greater than 5 years in hospital loaded at .83; Less than one year on the unit

loaded at -.77; and Greater than 5 years in the hospital loaded at .86 as shown in Table 11.

There was an explained variance of 60%.

TABLE 11. Sub-composite Variable for Experience and Content

Sub-composite Variable	Content	Component
Competency	Experience < 1 year at the Unit Level	-.77
	Experience < 1 year at the Hospital Level	-.63
	Experience 5 years or more at the Unit Level	.86
	Experience 5 years or more at the Hospital Level	.83
Explained Variance		60%

For the IS sub-composite, Lifecycle loaded at -.80; Computer Technology loaded at .80. There was an explained variance of 63%. Lifecycle was dropped from the analysis due to the unexplained negative indicator, and Computer Technology was used for the attempt at WFA formation as a single variable not a sub-composite.

Composite Variable for Workforce Agility

Factor Analysis with principle component extraction was used when forced to one factor. Results are shown in Table 12.

TABLE 12. Results of FA for WFA

Variable	Factor 1	Factor 2	Variance Explained
Intelligence		.56	
Collaboration	.86		
Competency		.78	
Culture	.90		
Information Systems	.40	-.60	
			62%

Since Information Systems (represented by Computer Technology) did not clearly load on either factor, it was dropped and the analysis rerun. Both Collaboration and Culture loaded at .89 on Factor 1 which was labeled Group Collaboration. Intelligence and

Competency loaded at .84 and .65 respectively on Factor 2 which was labeled Group

Experience. These two factors explained 72% of the variance.

Separate factor analyses with forcing onto one factor solution were run on each of

the two WFA composites (Group Collaboration and Group Experience). For the Group

Collaboration sub-composite, items loaded at .91 and explained 83% of the variance in

Group Collaboration. For Group Experience, items loaded at .76 and explained 58% of the

variance. WFA was best described with two composites which were labeled Collaborative

Culture Agility (CCA) and Experiential Agility (EA). These two composite variables of

WFA were formed using factor loadings and were used for testing questions 3-5 (refer to

Table 13).

TABLE 13. Composite Variable Collaborative Culture Agility and Experiential Agility

Composite Variable	Content	Component
Collaborative Culture Agility	Group Culture	.91
	Agility Collaboration	.91
Explained Variance		83%
Experiential Agility	Percent BSN	.76
	Agility Competency	.76
Explained Variance		58%

In summary, sub-composite variables were developed from proxy variables to

create two composite variables for WFA. Information Systems was dropped since it did not

load on either composite.

Research Question 3 (Model 2): Mediators

3. *Does WFA mediate (link) the Antecedents to ET?*

For a mediator to exist there must be a significant relationship between the independent variable and the outcome variable (Bennett, 2000). In the case of this research question, there must be a direct relationship between the Antecedents and ET. The results for Question 1 indicated that the relationship existed only for the Antecedents of Complexity and Team, but not for Workflow.

The steps to testing for a mediator variable are: 1) Test the relationship between the Independent Variables and the mediator (there must be a significant relationship); 2) Test the relationship between the Independent Variables and the outcome (a significant relationship must exist); and, 3) Test if there is a relationship between the Independent Variable and the mediator on the outcome variable. If a mediator exists, it must show a significant relationship with the outcome variable. The direct relationship of the independent variable to the outcome variable should be less than it was in the second equation (Bennett, 2000).

The results of mediator testing for Question 3 are shown in Table14. For Group Experience there was no significant relationship with Antecedents so testing for mediation did not proceed further. There was a significant relationship between both Antecedents of Complexity and Team with Group Collaboration, therefore Step 3 was run. The first condition of a significant relationship between the mediator and the outcome in this equation was not met; therefore there was not a mediating effect of Group Collaboration between Antecedents and ET.

TABLE 14. Mediator Effect of WFA Between Antecedents and ET

Step of Testing	Dependent Variable	Independent Variables	Beta	p	R^2

1	Group Experience	Complexity	-.21	.25	
		Team	.15	.37	
					.05
1	Group Collaboration	Complexity	-.33	.02	
		Team	.26	.13	
					.22
2	ET	Complexity	-.29	.11	
		Team	-.30	.09	
					.16
3	ET	Complexity	-.36	.06	
		Team	-.25	.16	
		Group Collaboration	-.20	.31	
					.19

Question 4 (Model 3): Mediators

4. *Does WFA mediate (link) the relationship between ET and PO?*

The same procedures for Question 3 were applied to the analysis for Question 4.

Results for testing will be shown by steps in the procedure since there were four outcomes

for analysis. The first examination was testing for a direct effect of ET on the four

outcomes (refer to Table 15).

TABLE 15. Patient Outcomes

Patient Outcomes	Beta for ET	p	R^2
Medication Errors	.23	.21	.05
General Satisfaction	-.13	.48	.02
Caring Satisfaction	-.39	.03	.15
Individual Satisfaction	-.03	.89	<.01

Since there was a direct effect of ET only on Caring Satisfaction, this was the only

mediator effect tested. Results of testing for a mediator effect are given in Table 16.

TABLE 16. Steps of Testing

Step of Testing	Dependent Variable	Independent Variables	Beta	p	R^2
1	Group Collaboration	ET	-.13	.49	.02
1	Group Experience	ET	.21	.26	.04
2	Satisfaction with Caring	ET	-.39	.03	.15
3	Satisfaction with Caring	ET	-.34	.05	
		Group Collaboration	.26	.15	
		Group Experience	-.40	.64	
					.22

There must be a significant relationship between the Independent Variable and the

mediator variable. Therefore, the criteria were not met in this analysis and should not

proceed. However, the final step in the analysis was presented because it gave evidence

that there may be a direct relationship between Group Collaboration (Beta= .26; p= .15)

and Satisfaction with Caring.

Research Question 5 (Model 4): Moderator

5. *Does WFA moderate (change) the relationship between ET and PO?*

Hierarchical regression was used to test for the moderating effects of the two WFA variables on the relationship of ET to the four outcome variables. The regressions were run in two steps. The independent variable and the two potential moderators were entered at the first step. Statistical significance was not required for the relationship of these variables on the outcomes, but allows the identification of the main effects of these variables. At the second step, the same variables were entered along with the interaction terms between ET and the WFA variables. In addition, since there were two potential moderators, an interaction term was created between them by computing the product of the two variables. If an interaction term explains a statistically significant amount of variance in the outcome, a moderator effect is considered present. The results to testing for moderator effects are shown in Tables 17 through 20.

No moderating effects of the WFA measures were noted for the outcome of Medication Errors; however, there were main effects of ET and Group Collaboration. It was interesting to note that while ET was not a significant predictor of Medication Errors when entered into a regression as the only independent variable (results from question 4); it became significant with the addition of the two potential moderators. With an increase in ET, there was an increase in Medication Errors. With an increased level of experience there was a decrease in Medication Errors. There were significant main effects but no significant moderator effect present (refer to Table 17).

TABLE 17. Moderator Effect (WFA) Between ET and Medication Errors

Step of Analysis	Variable Entered	Beta	p	R^2
1	ET	.27	.15	
	Group Experience	-.27	.16	
	Group Collaboration	-.05	.77	
				.13
2	ET	.73	.60	
	Group Experience	-.60	.50	
	Group Collaboration	.11	.77	
	ET *Experience	.50	.48	
	ET *Collaboration	-.89	.49	
	Experience*Collaboration	.19	.84	
				.16

No moderating effects of WFA measures were found for General Satisfaction (refer to Table 18). There was a significant main effect of Group Collaboration on General Satisfaction. Although not significant, it was interesting to note the direction of the relationships of variables to General Satisfaction. As expected, ET decreased satisfaction. It was unexpected that Group Experience also decreased satisfaction and its effect reduced the effect of Group Collaboration.

TABLE 18. Moderator Effect (WFA) Between ET and General Satisfaction

Step of Analysis	Variable Entered	Beta	p	R^2
1	ET	-.04	.82	
	Group Experience	-.19	.29	
	Group Collaboration	.39	.04	
				.18
2	ET	-.43	.76	
	Group Experience	.13	.89	
	Group Collaboration	.35	.33	
	ET *Experience	-.03	.97	
	ET *Collaboration	.42	.74	
	ET *Collaboration	-.35	.70	
				.18

Consistent with the findings from Research Question 4, there was a direct effect of ET and Group Collaboration on Caring Satisfaction. However, no moderator effect was noted (refer to Table 19).

TABLE 19. Moderator Effect (WFA) Between ET and Caring Satisfaction

Step of Analysis	Variable Entered	Beta	p	R^2
1	ET	-.34	.06	
	Group Experience	-.08	.64	
	Group Collaboration	.26	.15	
				.22
2	ET	-.35	.79	
	Group Experience	.42	.63	
	Group Collaboration	.34	.33	
	ET *Experience	-.11	.87	
	ET *Collaboration	.10	.94	
	ET *Collaboration	-.50	.57	
				.23

While no moderating effects were noted, there was a direct effect of Group Collaboration on Satisfaction with Individual Needs being met (refer to Table 20). Of further interest was the fact that the interaction term between ET and Group Experience has

potential for a moderating influence. This influence was positive, which would indicate that

it would improve the relationship between ET and Individual Satisfaction.

TABLE 20. Moderator Effect (WFA) Between ET and Individual Satisfaction

Step of Analysis	Variable Entered	Beta	p	R^2
1	ET	.06	.76	
	Group Experience	-.16	.37	
	Group Collaboration	.41	.03	
				.17
2	ET	-.05	.97	
	Group Experience	-.41	.63	
	Group Collaboration	.50	.16	
	ET *Experience	.76	.27	
	ET *Collaboration	-.52	.67	
	ET *Collaboration	-.03	.97	
				.22

Summary

This chapter has described the sample of this research. The five research questions

were individually discussed. The creation of sub-composite and composite variables was

described. Results of analyses to answer the five research questions were discussed

individually.

For question 1 (Model 1), three composite variables were developed for the

Antecedents to ET. They were Complexity, Team and Workflow.

In response to question 2 (Model 1), a composite variable for WFA was developed

based upon the definitional components of agility. Sub-composite variables were developed

creating two composite variables.

In response to question 3 (Model 2), there was no effect between ET and PO or the

mediator variable and the outcomes, so no further testing was warranted. In response to

question 4 (Model 3), there was no significant outcome of Caring with a mediator effect because the necessary criteria were not met. In response to question 5 (Model 4), there were significant main effects noted but no significant moderator effects present.

Based on the analysis of the four models, a fifth model was developed. This model will be discussed in detail in Chapter V.

CHAPTER V: CONCLUSIONS

Introduction

The purpose of this chapter is to discuss the findings from this research and the implications it may have on the profession of nursing and patient outcomes. The purpose of this research was to identify the relationship between Environmental Turbulence (ET), Workforce Agility (WFA) and Patient Outcomes (PO). Four theoretical models were presented and analyzed. The following five questions were presented:

1. What unit characteristics are antecedents to the perception of ET?

2. Can a composite variable of WFA be developed based upon the definitional components of agility?

3. Does WFA mediate (link) the antecedents to ET?

4. Does WFA mediate (link) the relationship between ET and PO?

5. Does WFA moderate (change) the relationship between ET and PO?

Research Question 1

What unit characteristics are Antecedents to the perception of ET? When creating the composite variable of Complexity, the Percent of High Complexity loaded as a negative value and was removed. This could be related to the fact that Percent of High Complexity was a more subjective measure and was obtained from the individual manager's perception not objective data.

The Antecedents found to impact ET were Team and Complexity. Workflow did not load and was dropped. This was a surprising result based on the findings of many studies where it was reported that staffing ratios, nursing hours and workload had a

significant impact on patient outcomes (Aiken, Clarke & Sloane, 2000; Blegen, Goode & Reed, 1998; Blegen & Vaugh, 1998; Kovner & Gergen, 1998; Needleman, Buerhaus, Mattke, Stewart & Zelevinsky, 2002). Workflow may have some influence on outcomes but it does not influence these outcomes through ET. This study addressed Workflow's effect on ET. It did not address the effect of Workflow on outcomes. This is an area in need of further investigation.

Research Question 2

Can a composite variable of WFA be developed based upon the definitional components of agility? Two proxy variables of WFA (i.e., Collaborative Culture and Experiential Agility) were successfully formed as composites and were tested with the primary data. Breu, et.al. (2001) reported that Intelligence and Competency were the strongest indicators of WFA. However, the results of this study found that Group Collaboration (i.e., Collaboration and Culture) loaded at .91 with an explained variance of 83% whereas Group Experience (i.e., Intelligence and Competency) only loaded at .76 with an explained variance of 58%. This could be related to the differences in how the variables were defined and measured.

Research Question 3

Does WFA mediate (link) the Antecedents to ET? There were main effects between the Antecedents of Team and Complexity with Group Collaboration, but no mediator effects presented. Therefore, no further testing was done

Research Question 4

Does WFA mediate (link) the relationship between ET and PO? There was a main effect of ET on Caring Satisfaction, so this was the only mediator tested for this question. The significance level was increased to .15 to accommodate the use of proxy measures. No mediator effects to patient outcomes presented.

Research Question 5

Does WFA moderate (change) the relationship between ET and PO? WFA was not a moderator but had a relationship with outcomes. When testing for a moderator effect between ET and Medication Errors, there were noted main effects between ET and Group Experience. When testing for the moderator effect between ET and General Satisfaction, there was a main effect noted between Group Collaboration and General Satisfaction, but no moderator effects present. When testing for a moderator effect between ET and Caring Satisfaction, there was a main effect between Group Collaboration, ET and Caring Satisfaction, but no moderator effect was present. When testing for a moderator effect between ET and Individual Satisfaction, a main effect was noted between Group Collaboration and Individual Satisfaction, but there was no moderator effect. However, the significance was that WFA affects satisfaction, and ET affects caring.

Discussion of Findings

Based on the results of this research, a model was developed depicting the direction of significant main effects on the outcomes (Refer to Figure 5).

FIGURE 5: MODEL 5
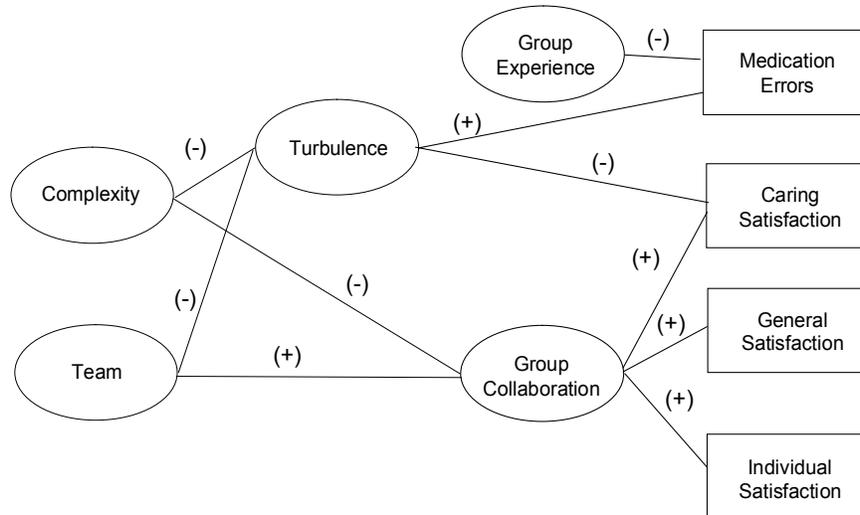
The results showed that Complexity created a decrease in ET which is not supported by the literature. In fact, this is opposite of what has been previously reported in the literature (Ebright, 2002; IOM, 2004).

Perhaps the variables used to construct the composite of Complexity were not the right variables when researching complexity in health care environments. When including a moderator variable in research, if there were measurement issues and if the error was in either of the independent variables, it could be compounded in the interaction variable. This can be difficult to detect when using multiple regression and may underestimate the effect of the moderator (Bennett, 2000). More research is needed on the construct of Complexity and its role in ET. The results did indicate that Complexity negatively impacted Group Collaboration which is supported in the literature (Breu, et al, 2001; Ebright, 2004).

The composite of Team created positive Group Collaboration and decreased ET which is also supported by the literature (Ekstedt & Fagerber, 2005; Garrett & McDaniel, 2001; Leppa, 1996). This finding supported CAS by impacting the response of groups and their ability to adapt to the situation or to continue in the same pattern.

As for Patient Outcomes, the results indicated that the more the ET the more medication errors occurred. These findings further support the IOM's (2004) report. The more experience nurses had, the lesser the medication errors occurred. This supports Benner (1984) and Ebright's et al., (2004) work. However, some of the same researchers have reported that nurses who have been in the profession a long time are more prone to burnout (Benner, 1984; Ebright, 2003; Ebright, 2004; Foley, Kee, Minick, Jennings, 2002) and those who are suffering from burnout may have memory loss and performance problems (Ekstedt & Fegerberg, 2005). This is an area deserving of more research.

Another possible reason for these results can be tied back to the research on interruptions. It was reported that by performing an interrupted task over and over led to a decrease of negative disruptive effects of those interruptions (Cades, Trafton & Boehm-Davis, 2006). This could explain the reason why the more experience that nurses had, the lesser medication errors occurred. Experienced nurses can better adapt to the interruptions and changes without making an error.

The more ET, the less the patients felt satisfied with their care. Job satisfaction in nurses improved patient satisfaction thus improving patient outcomes (McClure, et. al., 1983). These findings support CT which speaks to patient outcomes and success being dependent on the environment and how patients feel cared for.

Group Collaboration had a positive impact on Caring Satisfaction, General Satisfaction and Individual Satisfaction indicating that if the group functioned more collaboratively, patients and nurses were more satisfied. This finding supported the work by Garrett & McDaniel (2002), Sayler (1995) and Watson (2002) who found that a turbulent environment can have a negative impact on communication skills and interpersonal relationships. These findings supported STT by showing the connection between interrelatedness of the social and technological subsystems and their relationship to the environment. Magnet characteristics support the tenets of Collaboration Agility by supporting professional nursing practice. Magnet characteristics in relation to WFA and ET are areas in need of further research.

WFA's variable of Intelligence was defined by the percent of RNs assigned to a patient care unit with a Baccalaureate degree or higher. This was a proxy variable created from existing data and may not have been the best measure for intelligence of RNs. RNs educational preparation and its impact on patient outcomes is an area deserving of more research.

Limitations and Future Research

Secondary analysis was done using an existing sample from primarily the Southwestern portion of the United States on specific units within the acute care setting. This could limit the generalizability of these results. To increase the generalizability of this research, perhaps it would be beneficial to extend the scope of this study to include specialty areas such as the critical care units, child and maternal health and psychiatric units, as well as the community health organizations.

If WFA was measured directly, not using secondary analysis, possibly better measures for Information Systems and Culture could have been developed. Proxies for WFA were created; however, there might be a better way to measure it. There may be more appropriate tools available for measuring culture and competency. Since several of the factors didn't load during the factor analysis, they were dropped from the study. However, if a tool was designed specifically for this research, it may have yielded very different results.

When testing for a mediator effect, the assumption is that the outcome variable does not predict the mediator effect. Health care is complex, and perhaps a linear model wasn't best for this research. Although they were not addressed in this study, there are many recursive feedback loops that warrant further investigation with all three constructs of ET, WFA and PO. If the sample size had been larger, Structure Equation Modeling (SEM) could have been utilized to analyze the data possibly yielding different results.

Although there were positive interaction terms identified, the overall results from this research were inconclusive. However, it has provided a template for how to research the relationship between ET, WFA and PO. Further research needs to be conducted on ET and WFA and how patient outcomes are impacted by their relationship. A tool needs to be created to further identify the Antecedents to ET so that eventually health care organizations can try to control for this phenomenon. Also, a tool needs to be further developed to measure the components of WFA from a nursing perspective.

Summary

The unit characteristics that were found to be Antecedents to ET were the composites of Team and Complexity. The composite Workflow did not load and was dropped from the analysis. Proxy variables, Collaborative Culture Agility and Experiential Agility, were successfully formed as composites for WFA and were tested with the primary data. No mediators or moderators were shown; however, main effects of WFA and ET do have an impact on patient outcomes.

Based on the findings from this research as well as the literature, it has been shown that health care environments will always be turbulent: Therefore, time should be spent researching how to effectively respond to the ET hence WFA, which is a positive response to ET. By focusing on WFA, researchers can find ways to impact workers' response to the ET.

APPENDIX A

DATA COLLECTION TOOLS:

A. UNIT MANAGER SURVEY

B. HOW WELL CARED FOR WERE YOU (WCF)?

C. STAFF SURVEY

D. SELF CARE: CONDITION MANAGEMENT

E. QUALITY MANAGEMENT STAFF SURVEY

F. PHARMACY STAFF SURVEY

G. INFORMATION SYSTEMS STAFF SURVEY

Unit Characteristics and Quality of Care

UNIT MANAGER SURVEY

The purpose of this study is to identify patient, hospital, and unit characteristics that are related to quality of care in acute care hospitals. We hope that the study will help us understand factors in the hospital setting that may be modified to improve care quality.

Please provide answers to each question. Please note that some questions may ask you for specific information about your unit; others will ask you for your views about your hospital as a whole. If you have any problems with any of the questions, please contact one of the study team members. Your responses will be grouped with others, so that your confidentiality is assured. You will be asked to complete these questions once. Thank you for your participation.

1. Hospital Name _____

2. Unit Name _____

3. What is the total number of beds on your unit? _____

4. What is the type of your unit? (Select one answer only)

_____ Medical Unit – one specialty only
_____ Medical Unit – multi-specialty
_____ Surgical Unit – one specialty only
_____ Surgical Unit – multi-specialty
_____ Medical-Surgical Unit – one specialty only
_____ Medical-Surgical Unit – multi-specialty
_____ Step-down Unit
_____ Transitional Care Unit
_____ Other (please specify) _____

5. What is your highest level of education? (Check one)

_____ Diploma
_____ Associate Degree
_____ Baccalaureate Degree
_____ Masters Degree
_____ Doctorate

6. What is the length of time since you completed your highest level of education?

    _____ years _____ months (if less than a year)

7. What is the length of time you have worked in this hospital?

    _____ years _____ months (if less than a year)

8. What is the length of time you have been in your current position?

    _____ years _____ months (if less than a year)

9. What significant changes have occurred in your hospital over the past year? (Check all that apply)

    _____ Administrative Change (e.g., addition/deletion of senior or mid-level management positions, changes in organizational chart of management structure)
    _____ Financial Change (e.g., addition/loss of major contracts, changes in reimbursement)
    _____ Clinical Program Change (e.g., addition/termination of one or more new services, introduction of new technology, opening/closure of one or more units)
    _____ Environmental Change (e.g., major construction; reorganization of office or clinical space)
    _____ Organizational Change (e.g., merger, take-over)

10. In the hospital organization chart, what is the number of levels of administrators between the Chief Executive Officer (CEO) and the Patient Care Staff? (For example, if your organization chart has a level of Vice Presidents, Directors and Managers between the CEO and the patient care staff on the unit, there are 3 levels of administrators between the CEO and the patient care staff).

    _____ 1 Level
    _____ 2 Levels
    _____ 3 Levels
    _____ 4 or more Levels

11. Technology Assessment

Please place a check mark beside those technologies that are available in your hospital as a whole and on your unit.

Available in Your Hospital	NOT Available on Your Unit	
_____	_____	Computerized patient record
_____	_____	Physician computerized order entry
_____	_____	Computerized order entry (via unit clerk or nurses)
_____	_____	Automated laboratory results reporting
_____	_____	Unit dose medication system
_____	_____	Bar coding (for medication administration)
_____	_____	Bedside charting (on-line)
_____	_____	Computerized access to nursing literature
_____	_____	Automated drug dispensing (PYXIS, etc.)
_____	_____	Portable telephone information system
_____	_____	Management information system
_____	_____	Automated care maps
_____	_____	Automated teaching plans
_____	_____	Automated MARs
_____	_____	Automated alerts (e.g., potential drug interactions)
_____	_____	Online protocols
_____	_____	Patient servers at bedside (for linen, supplies, etc.)
_____	_____	Other (describe)
		_____

HOSPITAL CULTURE

Instructions: These questions relate to the type of hospital that your institution is most like. Each of these items contains four descriptions of hospitals. Please distribute 100 points among the four descriptions depending on how similar the description is to your hospital. None of the descriptions is any better than the others; they are just different. For each question, please use all 100 points. For example: In question 1, if Hospital A seems very similar to mine, B, seems somewhat similar, and C and D do not seem similar at all, I might give 70 points to A and the remaining 30 points to B.

12.　Hospital Character (Please distribute 100 points)

_____Hospital A is a very personal place. It is a lot like an extended family. People seem to share a lot of themselves.

_____Hospital B is a very dynamic and entrepreneurial place. People are willing to stick their necks out and take risks.

_____Hospital C is a very formalized and structured place. Bureaucratic procedures generally govern what people do.

_____Hospital D is a very production oriented. A major concern is with getting the job done. People aren't very personally involved.

13.　Hospital's Managers (Please distribute 100 points)

_____Managers in Hospital A are warm and caring. They seek to develop employees' full potential and act as their mentors and guides.

_____Managers in Hospital B are risk-takers. They encourage employees to take risks and be innovative.

_____Managers in Hospital C are rule-enforcers. They expect employees to follow established rules, policies, and procedures.

_____Managers in Hospital D are coordinators and coaches. They help employees meet the hospital's goals and objectives.

14.　Hospital Cohesion (Please distribute 100 points)

_____The glue that holds Hospital A together is loyalty and tradition. Commitment to this hospital runs high.

_____The glue that holds Hospital B together is commitment to innovation and development. There is an emphasis on being first.

_____The glue that holds Hospital C together is formal rules and policies. Maintaining a smooth running operation is important here.

_____The glue that holds Hospital D together is the emphasis on tasks and goal accomplishment. A production orientation is commonly shared.

15.   Hospital Emphases (Please distribute 100 points)

_____Hospital A emphasizes human resources. High cohesion and morale in the organization are important.

_____Hospital B emphasizes growth and acquiring new resources. Readiness to meet new challenges is important.

_____Hospital C emphasizes permanence and stability. Efficient, smooth operations are important.

_____Hospital D emphasizes competitive actions and achievement. Measurable goals are important.

16.   Hospital Rewards (Please distribute 100 points)

_____Hospital A distributes its rewards fairly equally among its members. It's important that everyone from top to bottom be treated as equally as possible.

_____Hospital B distributes its rewards based on individual initiative. Those with innovative ideas and actions are most rewarded.

_____Hospital C distributes rewards based on rank. The higher you are, the more you get.

_____Hospital D distributes rewards based on the achievement of objectives. Individuals who provide leadership and contribute to attaining the hospital's goals are rewarded.

17.   Method of Care Delivery

Identify the percentage of each of the following care delivery methods that most accurately describes care delivery on the nursing unit/service. Total distribution should equal 100%.

%	TYPE	DESCRIPTION
_____	Private Duty	RN employed by the patient/client and accountable for planning, coordinating, delivering, and evaluating nursing care to the patient/client.
_____	Functional	RN employed by organization and accountable for specific tasks and technical aspects of care to a group of patients/clients.
_____	Team	RN employed by organization and accountable for planning, coordinating, and evaluating nursing care for a group of patients/clients and for directing a team of professional and non-professional providers and assistants.
_____	Total Patient Care	RN employed by organization and accountable for planning, coordinating, delivering, and evaluating nursing care for one or more patients/clients for a work shift.
_____	Primary Nursing	RN employed by client or organization accountable for planning, coordinating, delivering, and evaluating nursing care over a 24-hour period with or without assistive staff.
_____	Case Management	RN employed by client or organization and accountable for planning, coordinating, monitoring, and evaluating the health care provided by an interdisciplinary team across the continuum of health care over a 24-hour period with or without assistive staff.
_____	Managed Care	RN employed by organization and accountable for coordinating clinical and financial aspects for covered lives.
_____	Community and Home Health Care	RN employed by organization and accountable for planning, coordinating, delivering, and evaluating nursing care for a case load or identified population in the community and /or home.
_____	Other	Specify:
		_____
100%	Total Percentage	

Thank you for completing this survey.

HOW WELL CARED FOR WERE YOU? (WCF)

Instructions: Please place a check mark (✓) or an X in the box beside the answer that best matches your opinion.

1. How satisfied are you with the amount of help you have received?

   ❑ Quite dissatisfied (1)
   ❑ Indifferent or mildly dissatisfied (2)
   ❑ Mostly satisfied (3)
   ❑ Very satisfied (4)

2. Considering your particular needs, how appropriate are the services you have received?

   ❑ Highly appropriate (4)
   ❑ Generally appropriate (3)
   ❑ Generally inappropriate (2)
   ❑ Highly inappropriate (1)

3. Have the services you received helped you to deal more effectively with your problems?

   ❑ Yes, it helped a great deal
   ❑ Yes, it helped somewhat
   ❑ No, it really didn't help
   ❑ No, it seemed to make things worse

4. How satisfied are you with the amount of nursing care you have received?

   ❑ Quite dissatisfied (1)
   ❑ Indifferent or mildly dissatisfied (2)
   ❑ Mostly satisfied (3)
   ❑ Very satisfied (4)

5. Considering your particular needs, how appropriate is the nursing care you have received?

   ❑ Highly appropriate (4)
   ❑ Generally appropriate (3)
   ❑ Generally inappropriate (2)
   ❑ Highly inappropriate (1)

6. Has the nursing care you received helped you to deal more effectively with your problems?

   ❑ Yes, it helped a great deal (4)
   ❑ Yes, it helped somewhat (3)
   ❑ No, it really didn't help (2)
   ❑ No, it seemed to make things worse (1)

7. When you talked to the person with whom you worked most closely, how closely did he or she listen to you?

   ❑ Not at all closely (1)
   ❑ Not too closely (2)
   ❑ Fairly closely (3)
   ❑ Very closely (4)

8. When you talked to the <u>nurse</u> with whom you worked most closely, how closely did he or she listen to you?

   ❑ Not at all closely (1)
   ❑ Not too closely (2)
   ❑ Fairly closely (3)
   ❑ Very closely (4)

9. How clearly did the person with whom you worked most closely understand your problem and how you felt about it?

   ❑ Very clearly (4)
   ❑ Clearly (3)
   ❑ Somewhat unclearly (2)
   ❑ Very unclearly (1)

10. How clearly did the <u>nurse</u> with whom you worked most closely understand your problem and how you felt about it?

    ❑ Very clearly (4)
    ❑ Clearly (3)
    ❑ Somewhat unclearly (2)
    ❑ Very unclearly (1)

11. How competent and knowledgeable was person with whom you worked most closely?
    ❑ Poor abilities at best (1)
    ❑ Only of average ability (2)
    ❑ Competent and knowledgeable (3)
    ❑ Highly competent and knowledgeable (4)

12. How competent and knowledgeable was the <u>nurse</u> with whom you have worked most closely?

    ❑ Poor abilities at best (1)
    ❑ Only of average ability (2)
    ❑ Competent and knowledgeable (3)
    ❑ Highly competent and knowledgeable (4)

13. In an overall, general sense, how satisfied are you with the services you have received?

❑ Very satisfied
❑ Mostly satisfied
❑ Indifferent or mildly dissatisfied
❑ Quite dissatisfied

14. In an overall, general sense, how satisfied are you with the <u>nursing care</u> you have received?

❑ Very satisfied
❑ Mostly satisfied
❑ Indifferent or mildly dissatisfied
❑ Quite dissatisfied

15. How satisfied are you with the respect shown to you by your <u>nurses</u>?

❑ Quite dissatisfied (1)
❑ Indifferent or mildly dissatisfied (2)
❑ Mostly satisfied (3)
❑ Very satisfied (4)

16. How satisfied are you with the <u>nurses</u>' responses to your cultural needs (if any)?

❑ Very satisfied (4)
❑ Mostly satisfied (3)
❑ Indifferent or mildly dissatisfied (2)
❑ Quite dissatisfied (1)
❑ Not Applicable

17. How satisfied are you with the amount of time <u>nurses</u> spent on your care?

❑ Quite dissatisfied (1)
❑ Indifferent or mildly dissatisfied (2)
❑ Mostly satisfied (3)
❑ Very satisfied (4)

18. If a friend were in need of similar care, would you recommend this program to him or her?

❑ No, definitely not (1)
❑ No, I don't think so (2)
❑ Yes, I think so (3)
❑ Yes, definitely (4)

19. How satisfied were you that the <u>nurse</u> worked on your behalf to get you the care you needed?

- ❏ Quite dissatisfied (1)
- ❏ Indifferent or mildly dissatisfied (2)
- ❏ Mostly satisfied (3)
- ❏ Very satisfied (4)

20. How satisfied are you with the amount of input you had into the decisions made about your health care?

- ❏ Very satisfied (4)
- ❏ Mostly satisfied (3)
- ❏ Indifferent or mildly dissatisfied (2)
- ❏ Quite dissatisfied (1)

21. How often did you see a Registered Nurse?

- ❏ Frequently (4)
- ❏ Sometimes (3)
- ❏ Seldom (2)
- ❏ Never (1)
- ❏ Don't know
- ❏ Couldn't tell

Thank you for completing this questionnaire!

Unit Characteristics and Quality of Care
STAFF SURVEY

The purpose of this survey is to identify patient, hospital, and unit characteristics that are related to quality of care in acute care hospitals. We hope that the study will help us understand factors in the hospital setting that may be modified to improve care quality. Please provide answers to each question. Please note that some questions may ask you for specific information about your unit and others will ask you for your views about your hospital as a whole. This packet contains a series of 8 sections. There may be new instructions for each section.

Section A: Demographic Information
1. Hospital Name
    _____

2. Your Unit: _____

3. Your Job Title

    ____ Clergy
    ____ Dietitian
    ____ Licensed Practical Nurse
    ____ Patient Care Technician
    ____ Pharmacist
    ____ Physician
    ____ Registered Nurse
    ____ Social Worker
    ____ Therapist (please specify type) _____
    ____ Other (please specify type) _____

4. Your highest level of education
        (Check one)

    ____ Less than High School
    ____ High School
    ____ Diploma
    ____ Associate Degree
    ____ Baccalaureate Degree
    ____ Masters Degree
    ____ Doctorate

5. The length of time since you completed your highest level of education related to your current position:
    _____ years _____ months (if less than a year)

6. The length of time you have worked in this hospital:
    _____ years _____ months (if less than a year)

7. The length of time you have worked on this unit:
    _____ years _____ months (if less than a year)

8. What shift do you work? _____

9. Do you work: Full time ____ Part time ____ Per diem ____

10. If you work part time or per diem, approximately how many hours per month do you work? _____ hrs/month

11. How old were you as of your last birthday? _____

12. What is your gender? Female _____ Male _____

13. What is your race?

    ___ White, non-Hispanic   ___ Native American   ___ Asian

    ___ Hispanic   ___ Black/African American   ___ Other

Section B

Instructions: These questions relate to the type of hospital that your institution is most like. Each of these items contains four descriptions of hospitals. Please distribute 100 points among the four descriptions depending on how similar the description is to your hospital. None of the descriptions is any better than the others; they are just different. For each question, please use all 100 points. *For example: In question 1, if Hospital A seems very similar to mine, B, seems somewhat similar, and C and D do not seem similar at all, I might give 70 points to A and the remaining 30 points to B.*

14. Hospital Character (Please distribute 100 points)

_____ Hospital A is a very personal place. It is a lot like an extended family. People seem to share a lot of themselves.
_____ Hospital B is a very dynamic and entrepreneurial place. People are willing to stick their necks out and take risks.
_____ Hospital C is a very formalized and structured place. Bureaucratic procedures generally govern what people do.
_____ Hospital D is a very production oriented. A major concern is with getting the job done. People aren't very personally involved.

15. Hospital's Managers (Please distribute 100 points)

_____ Managers in Hospital A are warm and caring. They seek to develop employees' full potential and act as their mentors and guides.
_____ Managers in Hospital B are risk-takers. They encourage employees to take risks and be innovative.
_____ Managers in Hospital C are rule-enforcers. They expect employees to follow established rules, policies, and procedures.
_____ Managers in Hospital D are coordinators and coaches. They help employees meet the hospital's goals and objectives.

16. Hospital Cohesion (Please distribute 100 points)

_____ The glue that holds Hospital A together is loyalty and tradition. Commitment to this hospital runs high.
_____ The glue that holds Hospital B together is commitment to innovation and development. There is an emphasis on being first.
_____ The glue that holds Hospital C together is formal rules and policies. Maintaining a smooth running operation is important here.
_____ The glue that holds Hospital D together is the emphasis on tasks and goal accomplishment. A production orientation is commonly shared.

17. Hospital Emphases (Please distribute 100 points)

_____Hospital A emphasizes human resources. High cohesion and morale in the organization are important.
_____Hospital B emphasizes growth and acquiring new resources. Readiness to meet new challenges is important.
_____Hospital C emphasizes permanence and stability. Efficient, smooth operations are important.
_____Hospital D emphasizes competitive actions and achievement. Measurable goals are important.

18. Hospital Rewards (Please distribute 100 points)

_____Hospital A distributes its rewards fairly equally among its members. It's important that everyone from top to bottom be treated as equally as possible.
_____Hospital B distributes its rewards based on individual initiative. Those with innovative ideas and actions are most rewarded.
_____Hospital C distributes rewards based on rank. The higher you are, the more you get.
_____Hospital D distributes rewards based on the achievement of objectives. Individuals who provide leadership and contribute to attaining the hospital's goals are rewarded.

Section C

Instructions: For the next set of questions, please fill in the one best answer.

19. Generally speaking, I am very satisfied with this job.

   - O   Strongly disagree (1)
   - O   Disagree (2)
   - O   Neutral (3)
   - O   Agree (4)
   - O   Strongly agree (5)

20. I rarely think of quitting this job.

   - O   Strongly disagree (1)
   - O   Disagree (2)
   - O   Neutral (3)
   - O   Agree (4)
   - O   Strongly agree (5)

21. I am generally satisfied with the kind of work I do in this job.

   - O   Strongly disagree (1)
   - O   Disagree (2)
   - O   Neutral (3)
   - O   Agree (4)
   - O   Strongly agree (5)

22. Most people on this job are very satisfied with the job.

   - O   Strongly disagree (1)
   - O   Disagree (2)
   - O   Neutral (3)
   - O   Agree (4)
   - O   Strongly agree (5)

23. People on this job rarely think of quitting.

   - O   Strongly disagree (1)
   - O   Disagree (2)
   - O   Neutral (3)
   - O   Agree (4)
   - O   Strongly agree (5)

24. On average, how often does nursing staff have to leave the unit to <u>get food</u> for a patient?

        O   Rarely or never
        O   Less than once a week
        O   Once or twice a day
        O   More than twice a day

25. On average, how often does nursing staff have to leave the unit to <u>transport a patient</u> for a test?

        O   Rarely or never
        O   Less than once a week
        O   Once or twice a day
        O   More than twice a day

26. On average, how often does nursing staff have to leave the unit to <u>pick up medications or IV fluids</u>?

        O   Rarely or never
        O   Less than once a week
        O   Once or twice a day
        O   More than twice a day

27. On average, how often does nursing staff have to leave the unit to <u>obtain supplies</u>?

        O   Rarely or never
        O   Less than once a week
        O   Once or twice a day
        O   More than twice a day

28. On average, how often does nursing staff have to leave the unit to <u>obtain linens</u>?

        O   Rarely or never
        O   Less than once a week
        O   Once or twice a day
        O   More than twice a day

29. In order to complete my patient assignment, the distance I have to cover is:

        O   Very large
        O   Large
        O   Neither large nor small
        O   Small
        O   Very small

Section D

This next set of questions contains statements about your care team, and how it functions as a group. In answering the questions, please consider the care team of which you are a member. *"A team is a small number of people with complementary skills who are committed to a common purpose (i.e., care of a particular group of patients), performance goals, and approach for which they hold themselves mutually accountable" (Katzenbach & Smith, 1994, p. 45).*

30. In my opinion, my usual care team consists of:

      O   Individuals from one discipline
      O   Individuals from two to four disciplines
      O   Individuals from five or more disciplines

31. My usual care team consists of:

      O   Mostly members who are relatively permanent members of the group
      O   Some members who are relatively permanent members and some who change frequently
      O   Members who frequently change

Section E

Instructions: Based upon the team you described in questions 30 and 31, choose the one best answer for each member of your team. If you do not consider any of these disciplines to be a member of your care team at any time, please mark NA. For your own discipline, please consider your interactions with other members of your discipline who are also members of your care team.

32. My usual care team consists of

	Not applicable	Never	Rarely	Occasionally	Often	Constantly
Dietitian	O	O	O	O	O	O
Pharmacist	O	O	O	O	O	O
Physicians	O	O	O	O	O	O
Registered Nurses	O	O	O	O	O	O
Other Nursing Staff	O	O	O	O	O	O
Social Workers	O	O	O	O	O	O
Therapists	O	O	O	O	O	O

33. How frequently do you communicate with each of these groups about caring for patients?

	Not applicable	Never	Rarely	Occasionally	Often	Constantly
Dietitian	O	O	O	O	O	O
Pharmacist	O	O	O	O	O	O
Physicians	O	O	O	O	O	O
Registered Nurses	O	O	O	O	O	O
Other Nursing Staff	O	O	O	O	O	O
Social Workers	O	O	O	O	O	O
Therapists	O	O	O	O	O	O

34. Do people in these groups communicate with you in a timely way about caring for patients?

	Not applicable	Never	Rarely	Occasionally	Often	Constantly
Dietitian	O	O	O	O	O	O
Pharmacist	O	O	O	O	O	O
Physicians	O	O	O	O	O	O
Registered Nurses	O	O	O	O	O	O
Other Nursing Staff	O	O	O	O	O	O
Social Workers	O	O	O	O	O	O
Therapists	O	O	O	O	O	O

35. Do people in these groups communicate with you accurately about caring for patients?

	Not applicable	Never	Rarely	Occasionally	Often	Constantly
Dietitian	O	O	O	O	O	O
Pharmacist	O	O	O	O	O	O
Physicians	O	O	O	O	O	O
Registered Nurses	O	O	O	O	O	O
Other Nursing Staff	O	O	O	O	O	O
Social Workers	O	O	O	O	O	O
Therapists	O	O	O	O	O	O

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

	Not applicable	Try to avoid blame	Mostly try to avoid blame	Try to avoid blame and solve problem	Mostly try to solve problem	Try to solve the problem
Dietitian	O	O	O	O	O	O
Pharmacist	O	O	O	O	O	O
Physicians	O	O	O	O	O	O
Registered Nurses	O	O	O	O	O	O
Other Nursing Staff	O	O	O	O	O	O
Social Workers	O	O	O	O	O	O
Therapists	O	O	O	O	O	O

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

	Not applicable	Not much	A little	Some	A lot	Everything
Dietitian	O	O	O	O	O	O
Pharmacist	O	O	O	O	O	O
Physicians	O	O	O	O	O	O
Registered Nurses	O	O	O	O	O	O
Other Nursing Staff	O	O	O	O	O	O
Social Workers	O	O	O	O	O	O
Therapists	O	O	O	O	O	O

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

	Not applicable	Not much	A little	Some	A lot	Completely
Dietitian	O	O	O	O	O	O
Pharmacist	O	O	O	O	O	O
Physicians	O	O	O	O	O	O
Registered Nurses	O	O	O	O	O	O
Other Nursing Staff	O	O	O	O	O	O
Social Workers	O	O	O	O	O	O
Therapists	O	O	O	O	O	O

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

	Not applicable	Not at all	A little	Some	A lot	Same goals
Dietitian	O	O	O	O	O	O
Pharmacist	O	O	O	O	O	O
Physicians	O	O	O	O	O	O
Registered Nurses	O	O	O	O	O	O
Other Nursing Staff	O	O	O	O	O	O
Social Workers	O	O	O	O	O	O
Therapists	O	O	O	O	O	O

40. The members of my team are responsible for determining the methods, procedures, and schedules with which the work gets done.

     O   Strongly agree (5)
     O   Agree (4)
     O   Neither agree nor disagree (3)
     O   Disagree (2)
     O   Strongly disagree (1)

41. My team rather than my manager decides who does what tasks within the team.

     O   Strongly agree (5)
     O   Agree (4)
     O   Neither agree nor disagree (3)
     O   Disagree (2)
     O   Strongly disagree (1)

42. Most work-related decisions are made by the members of my team rather than by my manager.

     O   Strongly agree (5)
     O   Agree (4)
     O   Neither agree nor disagree (3)
     O   Disagree (2)
     O   Strongly disagree (1)

43. Most members of my team get a chance to learn the different tasks the team performs.

     O   Strongly agree (5)
     O   Agree (4)
     O   Neither agree nor disagree (3)
     O   Disagree (2)
     O   Strongly disagree (1)

44. Most everyone on my team gets a chance to do the more interesting tasks.

       O   Strongly agree (5)
       O   Agree (4)
       O   Neither agree nor disagree (3)
       O   Disagree (2)
       O   Strongly disagree (1)

45. Task assignments often change from day to day to meet the work load needs of the team.

       O   Strongly agree (5)
       O   Agree (4)
       O   Neither agree nor disagree (3)
       O   Disagree (2)
       O   Strongly disagree (1)

46. The work performed by my team is important to the patients in my area.

       O   Strongly agree (5)
       O   Agree (4)
       O   Neither agree nor disagree (3)
       O   Disagree (2)
       O   Strongly disagree (1)

47. My team makes an important contribution to serving the hospital's patients.

       O   Strongly agree (5)
       O   Agree (4)
       O   Neither agree nor disagree (3)
       O   Disagree (2)
       O   Strongly disagree (1)

48. My team helps me feel that my work is important to the hospital.

       O   Strongly agree (5)
       O   Agree (4)
       O   Neither agree nor disagree (3)
       O   Disagree (2)
       O   Strongly disagree (1)

49. The team concept allows all the work on a given patient to be completed by the same set of people.

       O   Strongly agree (5)
       O   Agree (4)
       O   Neither agree nor disagree (3)
       O   Disagree (2)
       O   Strongly disagree (1)

50. My team is responsible for all aspects for its area of a patient's care.

- O   Strongly agree (5)
- O   Agree (4)
- O   Neither agree nor disagree (3)
- O   Disagree (2)
- O   Strongly disagree (1)

51. My team is responsible for its own unique area or segment of patient care.

- O   Strongly agree (5)
- O   Agree (4)
- O   Neither agree nor disagree (3)
- O   Disagree (2)
- O   Strongly disagree (1)

52. The results of my team's efforts provide immediate feedback for altering work processes quickly.

- O   Strongly agree (5)
- O   Agree (4)
- O   Neither agree nor disagree (3)
- O   Disagree (2)
- O   Strongly disagree (1)

53. The results of my team's efforts provide objective evidence of how well we work as a team.

- O   Strongly agree (5)
- O   Agree (4)
- O   Neither agree nor disagree (3)
- O   Disagree (2)
- O   Strongly disagree (1)

54. The results of my team's efforts provide subjective feelings about our performance as a team.

- O   Strongly agree (5)
- O   Agree (4)
- O   Neither agree nor disagree (3)
- O   Disagree (2)
- O   Strongly disagree (1)

Section F

Instructions: **In answering the next set of questions, please consider the environment on your patient care unit during the last month.**

55. On this unit we have no control over the types of patients in our patient care assignment.

- O   Strong disagreement
- O   Moderate disagreement
- O   Slight disagreement
- O   Slight agreement
- O   Moderate agreement
- O   Strong agreement

56. On this unit physicians change their orders so frequently that we have difficulty planning our work.

- O   Strong disagreement
- O   Moderate disagreement
- O   Slight disagreement
- O   Slight agreement
- O   Moderate agreement
- O   Strong agreement

57. On this unit we could do a better job if we had more information about our patients' conditions.

- O   Strong disagreement
- O   Moderate disagreement
- O   Slight disagreement
- O   Slight agreement
- O   Moderate agreement
- O   Strong agreement

58. Frequent transfers on and off this unit (for diagnostic studies, procedures, etc.) make it difficult for us to get our work done.

- O   Strong disagreement
- O   Moderate disagreement
- O   Slight disagreement
- O   Slight agreement
- O   Moderate agreement
- O   Strong agreement

59. Frequent discharges on this unit make it difficult for us to do a good job.

- O   Strong disagreement
- O   Moderate disagreement
- O   Slight disagreement
- O   Slight agreement
- O   Moderate agreement
- O   Strong agreement

60. Frequent admissions on this unit make it difficult for us to plan our work.

- O   Strong disagreement
- O   Moderate disagreement
- O   Slight disagreement
- O   Slight agreement
- O   Moderate agreement
- O   Strong agreement

Please go to next page.

Section G

Instructions: **The following items represent opinions about your professional practice. Please respond to each item. It is very important that you give your honest opinion. Please fill in the circle that most closely indicates how you feel about each statement.** Registered Nurses should complete all questions. All other professional staff should complete shaded areas only.

The left set of circles indicates degrees of disagreement. The right set of circles indicates degrees of agreement. The center circle means "undecided." Please use it as little as possible. The more strongly you feel about the statement, the further from the center you should fill in the circle, with disagreement to the left and agreement to the right.

On this nursing unit:	Disagree			Undecided			Agree
61. We are free to consult with others when solving complex care problems.	O	O	O	O	O	O	O
62. We are free to modify or adapt patient care procedures and protocols.	O	O	O	O	O	O	O
63. We are free to provide holistic, patient-centered care.	O	O	O	O	O	O	O
64. We are free to plan strategies to meet our own developmental needs.	O	O	O	O	O	O	O
65. We are free to practice clinical skills to the best of our ability.	O	O	O	O	O	O	O
66. We are free to analyze problems critically.	O	O	O	O	O	O	O
67. We are free to help decide who is hired to work here.	O	O	O	O	O	O	O
68. We are free to plan care with other members of the health care team.	O	O	O	O	O	O	O
69. We are free to act on our own decisions related to care-giving.	O	O	O	O	O	O	O
70. We are free to coordinate care between patients and health care services outside the hospital.	O	O	O	O	O	O	O
71. We are free to negotiate our time off duty.	O	O	O	O	O	O	O
72. We are free to exert the authority needed to fulfill our job responsibilities.	O	O	O	O	O	O	O
73. We are free to ask for assistance from other staff members when needed.	O	O	O	O	O	O	O
74. We are free to evaluate current nursing policies and procedures.	O	O	O	O	O	O	O
75. We are free to evaluate the outcomes of nursing care.	O	O	O	O	O	O	O
76. We are free to influence standards of nursing practice in this hospital.	O	O	O	O	O	O	O
77. We are free to implement our nursing care in an efficient manner.	O	O	O	O	O	O	O
78. We are free to be creative in the delivery of nursing care.	O	O	O	O	O	O	O
79. We are free to influence staffing pattern on the unit(s) where we work.	O	O	O	O	O	O	O

80. We are free to introduce nursing practices and procedures.	O	O	O	O	O	O	O
81. We are free to identify problems in the delivery of nursing care.	O	O	O	O	O	O	O
82. We are free to adjust nursing care plans to meet patients' changing needs.	O	O	O	O	O	O	O
83. We are free to utilize research findings to improve our nursing practice.	O	O	O	O	O	O	O

Section H

Instructions: **The next set of questions address support service availability and responsiveness. Please respond to selections in both the left and right columns. The responses on the left side concern availability of support services and those on the right side concern responsiveness.** This section should be completed by nursing staff only.

Questions on the left side ask you about the availability of support services

Questions on the right side ask you about the level of responsiveness of those support services

Availability

	Not available	Inconsistently available	Consistently available		Poor responsiveness	Fair responsiveness	Good responsiveness	Service not available
84. Venipunctures/ blood specimen collection	O	O	O	85.	O	O	O	O
86. Specimen pick-up	O	O	O	87.	O	O	O	O
88. Patient transportation	O	O	O	89.	O	O	O	O
90. Supply cart stocked	O	O	O	91.	O	O	O	O
92. Ordering and stocking non-supply cart supplies	O	O	O	93.	O	O	O	O

Responsiveness

94. Stocked linen cart   95. ○ ○ ○ ○ ○

96. Answering call lights   97. ○ ○ ○ ○ ○

98. Cleaning/ mopping floors   99. ○ ○ ○ ○ ○

100. Emptying trash   101. ○ ○ ○ ○ ○

102. Cleaning room after patient discharge   103. ○ ○ ○ ○ ○

104. Scheduling patient follow-up appointments   105. ○ ○ ○ ○ ○

106. Phone answering   107. ○ ○ ○ ○ ○

108. Transcribing written orders   109. ○ ○ ○ ○ ○

110. Placing computerized information on patient chart   111. ○ ○ ○ ○ ○

112. Computerized order entry   113. ○ ○ ○ ○ ○

114. Making charts for new admissions   115. ○ ○ ○ ○ ○

116. Greeting/directing visitors, new patients   117. ○ ○ ○ ○ ○

118. Unit dose medications   119. ○ ○ ○ ○ ○

120. IV fluid preparation/delivery	O	O	O	O	O
121.	O	O	O	O	O
122. Starting IVs by IV team	O	O	O	O	O
123.	O	O	O	O	O
124. Assisting patients with menu selection	O	O	O	O	O
125.	O	O	O	O	O
126. Delivering snacks to patients	O	O	O	O	O
127.	O	O	O	O	O
128. Meal tray delivery/pick-up	O	O	O	O	O
129.	O	O	O	O	O
130. Feeding patients/assistance with tray set-up	O	O	O	O	O
131.	O	O	O	O	O
132. Diet teaching by nutritionist	O	O	O	O	O
133.	O	O	O	O	O
134. Respiratory therapy/equipment set-up and changing, Administer treatments	O	O		O	O
135.	O	O		O	O
136. Coordination of discharge planning	O	O	O	O	O
137.	O	O	O	O	O

Thank you for completing our survey.

SELF-CARE: CONDITION MANAGEMENT

(Adapted from Self-Efficacy Scales. [Lorig, K., Stewart, A., Ritter, P., Gonzalez, V., Laurent, D., Lynch, J. (1996). *Outcome Measures for Health Education and other Health Care Interventions*. Thousand Oaks, CA: Sage Publications])

Having an illness [having been hospitalized] often means doing different tasks and activities to manage your condition when you get home. We would like to know how confident [comfortable] you are in doing certain activities. For each of the following questions, please indicate the number that corresponds to you confidence that you can do the tasks regularly at the present time.

How confident are you that you can……

1. Do all the things necessary to manage your condition on a regular basis at home.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

2. Judge when changes in your condition mean you should seek medical help.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

3. Adapt your treatment plan safely without contacting your health care provider.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

4. Do things to reduce how much your condition affects your everyday life.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

5. Take your medications as prescribed and as needed to manage your condition or symptoms.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

6. Recognize problems due to your condition or its treatment such as difficulties due to unexpected responses to medications.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

7. Manage basic life activities such as diet or exercise as they relate to your condition.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

8. Get help with treatment routine if necessary.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

9. Follow prescribed treatment plan.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

10. Get information about your condition from reliable health care resources.

Not at all confident   1   2   3   4   5   6   7   8   9   10   Totally confident

Unit Characteristics and Quality of Care
QUALITY MANAGEMENT STAFF SURVEY

The purpose of this study is to identify patient, hospital, and unit characteristics that are related to quality of care in acute care hospitals. We hope that the study will help us understand factors in the hospital setting that may be modified to improve care quality.

Please provide the following information in the requested metric and format. All requested data is aggregated at the hospital level.

1.   Hospital Name _____

2.   Unit Name _____

Patient Events (aggregated)

3.   Medication Errors

For the month of _____, what was the total number of medication errors reported for this unit (including wrong dose, wrong patient, wrong time, wrong drug, wrong route and errors of omission)?

	MEDICATION ERRORS	*Number of Reported Medication Errors by Type of Error*
a.	Wrong Dose	_____
b.	Wrong Patient	_____
c.	Wrong Time	_____
d.	Wrong Drug	_____
e.	Wrong Route	_____
f.	Dose Omitted	_____

4. Falls

    For the month of _____, what was the total number of patient falls reported for this unit with injury to the patient and without injury?

Falls	*Number of Reported Falls by Type of Fall*
a.With Injury to Patient	_____
b.Without Injury to Patient	_____

5. Nosocomial Infections

For the month of _____, what was the total number of nosocomial infections reported for this unit (include pneumonia and urinary tract infection)?

	Nosocomial Infection	*Number Reported*
a.	Respiratory	_____
b.	Urinary Tract	_____
c.	Wound	_____
d.	Other	_____

6. Skin Breakdown

For the month of _____, what was the total number of patients reported to have developed skin breakdowns on this unit?

	Skin Breakdown	*Number Reported*
a.	Burn	_____
b.	Decubitus Ulcer	_____
c.	IV Infiltration	_____

Thank you for completing our survey.

Unit Characteristics and Quality of Care
PHARMACY STAFF SURVEY

The purpose of this study is to identify patient, hospital, and unit characteristics that are related to quality of care in acute care hospitals. We hope that the study will help us understand factors in the hospital setting that may be modified to improve care quality.

Please provide the following information in the requested metric and format. All requested data is aggregated at the unit level.

1. Hospital Name: _____

2. Unit Name: _____

3. For the month of _____, what was the total number of oral doses of medication delivered to this nursing unit?

    _____ Total number of oral doses of medications

4. For the month of _____, what was the total number of parenteral doses of medications delivered to this nursing unit?

    _____ Total number of parenteral doses of medications

5. For the month of _____, what was the total number of different medications sent to this nursing unit?

    _____ Total number of different medications

Unit Characteristics and Quality of Care
INFORMATION SYSTEMS STAFF SURVEY

The purpose of this study is to identify patient, hospital, and unit characteristics that are related to quality of care in acute care hospitals. We hope that the study will help us understand factors in the hospital setting that may be modified to improve care quality.

Please provide the following information in the requested metric and format. All requested data is aggregated at the hospital level.

HOSPITAL DATA

1. Hospital Name _____

OCCUPANCY DATA

2. Hospital Occupancy Rate

For the month of _____, what was the average bed occupancy rate?

3. Patient Days

For the month of _____, what was the total number of patient days?

4. Change in Hospital Admissions

What was the total number of hospital admissions for the last two calendar years?
(Complete first month only.)

	Year	*Total Hospital Admissions*
1.	2000	_____
2.	2001	_____

PAYMENT DATA

5. Patient Insurance

For the month of _____, what was the number of patient discharges for the hospital for each of the following payer groups?

Payer Type	*Percent of patient discharges in this payer group (total of all types should equal 100%)*
1. Medicare	_____%
2. Medicare – HMO	_____%
3. Medicaid (AHCCCS in Arizona)	_____%
4. Medicare & Medicaid	_____%
5. Commercial (Indemnity)	_____%
6. Commercial – HMO	_____%
7. PHS – Indian Health Service	_____%
8. Worker's Compensation	_____%
9. Tricare	_____%
10. Self-Pay	_____%
11. Uninsured	_____%
12. Other	_____%
	100 %

6. Reimbursement

For the month of _____, what was the number of patient discharges for the hospital with each of the following types of payment?

Payment Type	*Percent of patient discharges in this payment type (total of all types should equal 100%)*
1. Fee-for-service	_____%
2. Discounted Fee-for-service	_____%
3. Per Diem	_____%
4. Prospective – DRG	_____%
5. Prospective – Capitated (PMPM)	_____%
	100 %

Thank you for completing our survey.

APPENDIX B:

HUMAN SUBJECTS PROTECTION SECONDARY STUDY

THE UNIVERSITY OF

ARIZONA®

TUCSON ARIZONA

Human Subjects Protection Program

1350 N. Vine Avenue
P.O. Box 245137
Tucson, AZ 85724-5137
(520) 626-6721
http://www.irb.arizona.edu

31 May 2007

Carol Bosco, Ph.D. Student
Advisor: Joyce Verran, Ph.D.
College of Nursing
PO Box 210203

RE: THE RELATIONSHIP BETWEEN ENVIRONMENTAL TURBULENCE, WORKFORCE AGILITY AND PATIENT OUTCOMES

Dear Ms Bosco:

We received documents concerning your above cited project. Regulations published by the U.S. Department of Health and Human Services [45 CFR Part 46.101(b)(4)] exempt this type of research from review by our Institutional Review Board.

Please be advised that **clearance from academic and/or other official authorities for site(s) where proposed research is to be conducted must be obtained prior to performance of this study. Evidence of this must be submitted to the Human Subjects Protection Program office.**

Exempt status is granted with the understanding that no further changes or additions will be made to the procedures followed (copies of which we have on file) without the review and approval of the Human Subjects Committee and your College or Departmental Review Committee. Any research related physical or psychological harm to any subject must also be reported to each committee.

Thank you for informing us of your work. If you have any questions concerning the above, please contact this office.

Sincerely,

Rebecca Dahl, R.N., Ph.D.
Director
Human Subjects Protection Program

cc: Departmental/College Review Committee

APPENDIX C:

PRIMARY INVESTIGATOR APPROVAL (IMPACT)

THE UNIVERSITY OF ARIZONA COLLEGE OF NURSING

MEMORANDUM

TO: Human Subjects Committee

FROM: Joyce A. Verran PhD, RN, FAAN

DATE: March 13, 2007

SUBJECT: Use of Data for Secondary Analysis

As the Principle Investigator for the Impact of Nursing Unit Characteristics on Patient Outcomes Grant (AHRQ, R01 HS 11973, 2001-2004). I give permission for Carol Bosco to utilize the data for her secondary analysis entitled "The Relationship between Environmental Turbulence, Workforce Agility and Patient Outcomes". I have enclosed a copy of the original approval for data collection on the research grant.

REFERENCES

Al-Haider AS, Wan T. (1991). Modeling Organizational Determinants of Hospital Mortality. Health Services Research, 26(3), 303–23.

Aiken, L., Clarke, S., Cheung, R., Sloane, D. & Silber, J. (2003). Educational levels of hospital nurses and surgical patient mortality. JAMA, 290(12), 1617-1623.

Aiken, L., Clarke, S. & Sloane, D. (2000). Hospital restructuring. Does it adversely affect care and outcomes? JONA, 30(10), 457-465.

Aiken, L., Clarke, S. & Sloane, D., Sochalski, J. & Silber, J. (2002). Hospital nurse staffing and patient mortality, nurse burnout and job dissatisfaction. JAMA, 228(16), 1987-1993.

Aiken, L. & Patrician, P. (2000).Measuring organizational traits of hospitals: The revised nursing work index. Nursing Research, 49(3), 146-153.

Anderson, R. & McDaniel, R. (1992). The implication of environmental turbulence for nursing unit design in effective nursing homes. Nursing Economics, 10(2), 117-125.

Ash, Berg & Coiera (2204). Unintended consequences of IT in health care: The nature of patient care information systems related errors.

Baggs J.G. & Schmitt M.H. (1988) Collaboration between nurses and physicians. Image 20, 145-149

Bates, D., Spell, N., Cullen, D., et. al, (1997). The costs of adverse drug events in hospitalized patients. JAMA, 277, 307-311.

Baron, R. & Kenny, D. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51(6), 1173-1182.

Bavendam, J.(2000). Special Reports: Executive Management Through Measurement. Managing job satisfaction. Volume 3 (retrieved from the internet April 25, 2004).

Begun, J. & Kaissi, A. (2004). Uncertainty in health care environments: myth or reality? Health Care Management Review, 29(1), 31-39.

Belch, G. & Belch, M. (2007). An Integrated Marketing Communication Perspective, 7th ed. New York, McGraw- Hill.

Belenky, M., Clinchy, B., Goldberger, N. & Tarule, J. (1973). Women's Ways of Knowing. Basic Books, Inc. NY.

Benner, P. (1984). From Novice to Expert. Menlo Park: Addison-Wesley Publishing Company.

Bennett, J. (2000). Focus on Research Methods: Mediator and moderator variables in nursing research: Conceptual and statistical differences. Research in Nursing & Health, 23, 415-420.

Blegen, M., Goode, C. & Reed, L. (1998). Nurse staffing and patient outcomes. Nursing Research, 47(1), 43-50.

Blegen M. & Vaugh, T. (1998). A multi-site study of nurse staffing and patient occurrences. Nursing Economics, 16(4), 196-201.

Bosco, C. (2004). Environmental turbulence: a concept analysis. Unpublished doctoral work from University of Arizona.

Bosco, C. (2004). Nursing satisfaction: A concept analysis. Unpublished doctoral work from University of Arizona.

Breu, K., Hemingway, C., Strathern, M. & Bridger, D. (2001). Workforce agility: the new employee strategy for the knowledge economy. Journal of Information Technology, 17, 21-31.

Brewer, B. (2002). Development of measures of nursing work environments, staffing, nursing culture, team culture and turbulence. University of Arizona, manuscript.

Burns, T. & Stalker, G.M. (1961). The Management of Innovation. London, Tavistock.

Cades, D. M., Trafton, J. G., & Boehm-Davis, D. A. (2006). Mitigating disruptions: can resuming an interrupted task be trained? Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting.

Cameron, K.S., Kim, M.U. & Whetton, D.A. (1987). Organizational effects of decline and turbulence. Administrative Science Quarterly, 32, 222-240.

Cox, K. (2001). The effects of unit morale and interpersonal relations on conflict in the nursing unit. Journal of Advanced Nursing, 35(1), 17-25.

Curtin, L.(1997). Serious errors up 500%? Nursing Management, 28(7), 7.

Donabedian, A. (1988). The quality of care: How can it be assessed? Journal of the American Medical Association, 27(7/8), 23-32.

Ebright, P. (2004). Understanding nurse work. Clinical Nurse Specialist, 18(4), 168-170.

Ebright, Patterson, Chalko & Render. (2003). Understanding the complexity of registered nurse work in acute care settings. JONA, 33(12), 630-638.

Ebright, P., Urden, L. Patterson, E. & Chalko, B. (2004). Themes surrounding novice nurse near-miss and adverse event situations. JONA, 34(11), 531-538.

Ekstedt, M. & Fagerberg, I. (2005). Lived experiences of the time preceding burnout. JONA, 49(1), 59-67.

Field, A. (2003). Discovering Statistics. Sage, Thousand Oaks.

Fiesta, J. (1998). Liability for falls. Nursing Management, 29(3), 24-26.

Foley, Kee, Minick & Jennings (2002). Characteristics of nurses and hospital work environments that foster satisfaction and clinical expertise. JONA, 32(5), 273-282.

Forsythe, C. (1997). Human factors in agile manufacturing: a brief overview with emphasis on communications and information infrastructure. Human Factors and Ergonomics in Manufacturing, 7(1), 3-10.

Garrett, D. & McDaniel, A. (2001). A new look at nurse burnout. The effects of environmental uncertainty and social climate. JONA, 31(2), 91-96.

Gilligan, C. (1982). In a Different Voice: Psychological Theory and Women's Development. Harvard University Press, Cambridge.

Gonzales, F. (1998). Turbulence in Air Travel – Time for Change. Association of Flight Attendants, AFL-CIO, Southern California Safety Institute, 15th Annual International Aircraft Cabin Safety Symposium, Oklahoma City, Oklahoma. February 2.

Green, R., Rockmore, B. & Zimmerer, T. (1995). The impact of environmental turbulence on American hospitals. Journal of Management in Medicine, 9(6), 6-15.

Harter, J., Schmidt, F. & Hayes, T. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: a meta-analysis. Applied Psychology, Apr. 87(2):268-79.

Havens, D. & Aiken, L. (1999). Promoting systems to promote desired outcomes: The magnet hospital model. JONA, 29(2), 14-20.

Holden, L. (2005). Complex adaptive systems: concept analysis. JONA, 52(6), 651-657.

Institute of Medicine, (2004). Keeping Patients Safe. Washington, DC: The National Academic Press.

Institute of Medicine, (2001).To ERR is Human.. Washington, DC: The National Academic Press.

Ireton, G. (2004) Turbulence forecasts based on upper-air soundings. Accessed from the internet December 5, 2004.

Jaffee, D. (2001). Organization Theory. New York, McGraw-Hill.

Kalisch, B., Curley, M. & Stefanov, S. (2007). An intervention to enhance nursing staff teamwork and engagement. JONA. 37(2), 77-84.

Klein, K. & Kozlowski, S. (2000). Multilevel Theory, Research, and Methods in Organizations. San Francisco, Jossey-Bass, Inc.

Kramer, M. & Schmalenberg, C. (1993). Learning from success: autonomy and empowerment. Nursing Management, 24(5), 58, 59, 62 & 64.

Knaus, W., et al. (1986).An evaluation of outcome from intensive care in major medical centers. Annals of Internal Medicine, 104, 410-418.

Kovner, C. & Gergen, P.(1998). Nurse staffing levels and adverse events following surgery in US hospitals. Image: Journal of Nursing Scholarship, 10(4), 317-321.

Lawrence, P.R. & Lorsch, J. (1967). Differentiation and integration in complex organizations. Administrative Science Quarterly, 12, 1-47.

Leppa, C. (1996). Nurse relationships and work group disruption. JONA, 26(10), 23-27.

Levine M, Taylor J, & Davis L. (1984) Defining quality of work life. Human Relations. 37: 81-104.

Lin, l., Vicente, K. & Doyle, J. (2001). Patient safety, potential adverse drug events, and medical device design: a human factors engineering approach. Journal of Biomedical Informatics, 34, 274-284.

Ma, C., Samuels, M. E., & Alexander, J. W. (2003). Factors that influence nurses' job satisfaction. JONA, 33(5), 293-299.

Mark, B., Sayler, J. & Wan, T. (2000). Market hospital and unit characteristics as predictors of nursing unit skill mix: A contextual analysis. JONA, 30(11), 552-560.

McClure, M, Poulin, M. Sovie, M. & Wandelt, M. (1983). Magnet Hospitals Attraction and Retention of Professional Nurses. American Academy of Nursing Task Force on Nursing Practice in Hospitals. Kansas City, MO: American Nurses Association.

McMillen, B. (1999).Who's on first? Patient characteristics and the perceived quality of nursing care. In Proceedings of the Eighth National Conference on Nursing Administration Research, Nov., 3-5, San Diego, CA

McNeese-Smith, D.K. (1999). A content analysis of staff nurse descriptions of job satisfaction and dissatisfaction. Journal of Advanced Nursing. 29(6), 1332-1341.

Molloy, R. (2003). Defining competence. Progress in Practice, 14, 16.

Needleman, J., Buerhaus, P., Mattke, S., Stewart, M. & Zelevinsky, K. (2002). Nurse staffing and patient outcomes in hospitals. Final Report, US Department of Health and Human Services Health Resources and Services Administration, Feb. 28, 2001.

New York Board of Regents (2001). Protecting the Public. Blue Ribbon Task Force on the Future of Nursing. SUNY, Albany.

Nursing Executive Center Advisory Board (2005). The Agile Nursing Enterprise. Washington, D.C., The Advisory Board Company.

Pasmore, W., Francis, C. & Haldeman, J. (1982). Sociotechnical systems: A north American reflection on empirical studies of the seventies. Human Relations, 35(12), 1179-1204.

Polit, D. & Hungler, B. (1987). Nursing Research Principles and Methods (3rd ed). NY, Lippincott.

Potter, P., Barr, N., McSweeney, M. & Sledge, J. (2003). Identifying nurse staffing and patient outcome relationships: a guide for change in care delivery. Nursing Economics, 21(4), 158-166.

Potter, P., Wolf, L., Boxerman, S. & Grayson, D., Sledge, J., Dunagan, C. & Evanoff, B. (2005). Understanding the cognitive work of nursing in the acute care environment. JONA, 35(7/8), 327-335.

Pfeffer, J. & Salancik, G. (1978). The External Control of Organizations. New York, Harper & Row.

Rafferty, A., Ball, J. & Aiken, L. (2001). Are teamwork and professional autonomy compatible and do they result in improved hospital care? Quality Safety Health Care, 10(11), 32-37.

Sayler, J. (1995). Environmental turbulence impact on nurse performance. JONA, 25(4), pp12-20

Shortell, S. & Hughes, E. (1989). The effects of regulation, competition and ownership on mortality rates among hospital inpatients. New England Journal of Medicine, 318(17), 1100-1107.

Shortell, S, Rousseau, D. & Gillies, R. (1989). Analysis of process. Critical Care Medicine, 17, S213-S216.

Silber, J. & Rosenbaum, P. (1997). A spurious correlation between hospital mortality and complication rates: The importance of severity adjustment. Medical Care, 35(10 Suppl), OS77-92.

Smith, P., Kendall, L., Hulin, C. (1969), The Measurement of Satisfaction in Work and Retirement: A Strategy for the Study of Attitudes. Rand McNally, Chicago, IL,

Tillman, H. J., Salyer, J., Corley, M.C. & Mark, B.A. (1997). Environmental turbulence: staff nurse perspectives. Journal of Nursing Administration, 27(11), 15-22.

Trochim, W. (2001). The Research Methods Knowledge Base. Cincinnati, Atomic Dog

Verran, J.A., Effken, J., & Lamb, G. (2001-2003) Impact of Nursing Unit Characteristics on Outcomes, R01HS11973, Agency for Health Research & Quality, PHS.

Watson, C. (2002). Understanding the factors that influence nurses' job satisfaction. JONA, 32(5), 229-231.

Yun-Kyung, C. Hughes, L. & Mark, B. (2006). Fitting in or standing out: nursing workgroup diversity and unit-level outcomes. JONA, 55(6), 373-380.