Fall 2013

Mandatory Nurse-Patient Ratios and Nursing Outcomes Related to Patient Falls

Lillian Kathleen Roberts
Regis University

Mandatory Nurse-Patient Ratios and Nursing Outcomes Related to Patient Falls

Lillian Kathleen Roberts

Regis University

Doctor of Nursing Practice

Capstone Project

Dr. Louise Suit, Capstone Chair

Dr. Christine Finn and Dr. Colleen McCullum

September 6, 2013

Executive Summary

Mandatory Nurse-Patient Ratios and Nursing Outcomes Related To Patient Falls

Problem

The issue of mandatory nurse-patient ratios remains controversial among many vested stakeholders, including nurses, patients, physicians, unions, nursing organizations, researchers, employers (in particular hospitals), and federal and state governments (Douglas, 2010).

Purpose

The purpose of the study and decision to use the target agency, is to examine the relationship between patient falls and day-to-day, shift-to-shift variations in unit level staffing on the Medical / Surgical Unit at a small hospital in the southern area of the country.

Goals

The goal of the study was to examine the association between nurse-patient ratios and patient outcomes as it relates to a culture of safety.

Objectives

The objective of the study was to review data to evaluate any link between patient falls and any resulting injuries and poor nurse staffing ratios.

Plan

The Capstone Project was a retrospective descriptive study directed at reviewing data and examining the relationship between patient falls and staffing effectiveness specifically nurse to patient ratios on a busy Medical / Surgical Unit. Data was analyzed by reviewing charts of high fall risk patients admitted during the time frame of three months beginning January 01, 2013 through March 31, 2013 on the Medical Surgical Unit at a small hospital in the southern area of the country, using the Quantros version 5.10 Safety and Risk Management (SRM) solution. The Morse Fall measure was used to analyze for the risk of patient falls. The fall rates were determined by using data from incident reports, fall evaluator, and combined data from incident reports and the fall evaluator. Patient-days were determined for each nursing unit using hospital billing data. All fall rates were calculated as the (number of fall events 'patient-days) x 1000. Injurious fall rates were determined in a similar manner using the Safety Event Manager which was the core application of the Quantros version 5.10 Safety and Risk Management (SRM).

Outcomes and Results

Over a three month period from January 01, 2013 through March 31, 2013 patient falls was compared with registered nurse staffing on the busy Medical Surgical Unit with the bed capacity of 52. Data analysis revealed no significant differences in the patient falls and nurse staffing ratios ($p > .05$). Hourly rounding was found to be imperative to patient safety and the most valued intervention to prevent falls in this acute care facility.

Keywords: Mandatory Nurse-Patient Ratios; Nursing Outcomes; Patient Falls.

Acknowledgement

Nurse Staffing Ratios and Nursing Outcomes related to patient falls has truly been a passion of mine to do research on as I have been a nurse for twenty nine years and have worked in both direct and in-direct patient care. As the Fall Champion for this small hospital in the southern part of the country I have had the opportunity to have interactions with the staff on exactly how, when, and why the accidents occurred.

I would like to personally thank my professors at Regis University for the unique opportunity to which they have given to me, to pursue my dream to hold such a prestigious title as Doctorate of Nursing Practice. My professors at Regis University Ruckert-Hartman College for Health Professions have been instrumental in making this all possible.

I would also like to personally thank Dr. Louise Suit, Dr. Barbara Berg, Dr. Christine Finn, Dr. Marcia Gilbert, and Dr. Colleen McCallum and Calee Travis CNO, for their guidance and support during this long journey.

Lastly, I would like to say thank you to my supportive husband Kevin for his extended support throughout the program and for pushing me when I was exhausted and didn't feel like I could go any further.

Table of Contents

List of Appendices

List of Figures

List of Tables

MANDATORY NURSE-PATIENT RATIOS AND NURSING OUTCOMES

Capstone Project

A highly effective technique for mastery of knowledge is to learn by doing (Becker & Neuwirth, 2002). The written Capstone Project serves as the basis for both the oral and written project report and a defense at the end of the program. The Doctorate of Nursing Practice (DNP) project sought to adapt research to real situations. The final product should meet all of the academic institution's requirements for scholarly work (American Association of Colleges of Nursing, 2006). At its finest, it should reflect a synthesis of all of the knowledge and skills gained by the DNP student in the course of studies (American Association of Colleges of Nursing, 2006). The state of American health care will benefit enormously from a cadre of expert clinicians who can utilize evidence-based projects and tools to improve the outcomes of care delivered by advanced practice nurses (Zaccagnini & White, 2011).

Problem Recognition and Definition

Statement of the Purpose

The purpose of the study was to examine the relationship between patient falls and day-to-day, shift-to shift variation in unit level staffing on the medical/surgical unit at a small hospital in the Southern part of the country. Despite mandated attempts to ensure adequate staffing, fluctuation in patient needs and available staff can result in understaffing and jeopardize patient safety. Nurses are faced with the dilemma of fulfilling the most important organizational strategy, which is the commitment to a culture of safety, and a positive nursing practice environment. Furthermore, this researcher explored nurses' attitudes towards patient safety. A nurse who has knowledge that a situation places a patient at risk of harm has a duty to the patient to take action (Texas Board of Nursing, 2008). Nurses have a primary duty to patient safety and are obligated to speak up if they believe in good faith that their patient assignment may

compromise patient safety. All nurses regardless of their roles in the organization, have a responsibility to work together to ensure that available resources are used most appropriately to prove patient safety. This study was significant as falls are considered one of the nursing sensitive indicators American Nurses Association (ANA, 2009). Nurses are responsible for identifying patients who are at risk for falls and for developing a plan of care to minimize that risk (Joint Commission, 2009b). Patient fall rates were perceived as the indicator that could be most improved through nurse-led safety strategies or interventions (Tzeng & Yin, 2008). Falls are the leading cause of injury related to death among those 65 years of age or older and can lead to devastating consequences such as femur fractures, traumatic brain injury, and premature death. According to the Center for Disease Control (CDC) (2011), more than 8500 people older than 65 years died as a result of falls. Fall risk can be operationally defined as the rate at which patients fall during their hospital stays per 1000 patient days (Tzeng & Yin, 2008).

The population for the study consisted of two populations. High risk fall patient that score 45 or great on the Morse Fall Risk Scale, are admitted to the medical surgical unit, and registered nurses who comprise the staffing ratios. Nurse staffing ratios were defined as the ratio of nurses to patients on a hospital ward. Higher nurse to patient ratios were preferable because they indicate better outcomes for patients. Low ratios meant fewer nurses taking care of more patients. Other variables of concern were the acuity of patients that referred to how sick the patient was. Units with high acuity such as the intensive care unit have high staffing ratios because patients are unstable and required constant attention. On any normal day there were approximately six registered nurses (RNs) per 12 hour shift, with a potential census of 30 to 40 patients on the medical surgical unit.

Problem Statement and PICO Question

Based on the needs assessment of the chosen population, the following question about the population, intervention, comparison, and outcome (PICO) was developed:

Problem Statement: What is the relationship between patient falls and day-to-day, shift-to shift variations in unit level staffing on a medical/surgical unit at a small hospital in the Southern area of the country?

PICO Question: What is the effect on patient outcomes and on patient fall risk when registered nurses are added to unit staffing?

P – All registered nurses on the medical surgical unit.

I – Educational program regarding the quality indicators for patient fall prevention.

C – Compared to current practice – Preventing patient falls is crucial for every caregiver who practices in a clinical setting. Multidisciplinary teams across the continuum of care convene each day as falls "champions" to determine the best ways to identify patients at highest risk for falls and to develop strategies (American Nurse Today, 2011).

O – Measurement of patient falls is currently monitored on a daily basis per Centers for Medicare and Medicaid Services (CMS) and Joint Commission requirements. CMS requires that a healthcare facility be a safe environment and setting for care. CMS also requires the safety of at risk patients be assessed regularly and corrected if found to be deficient. A facility that fails to correct deficiencies is violating conditions of participation and could lose its Medicare or Medicaid funding (American Nurse Today, 2011). In 2005, The Joint Commission introduced a national patient safety goal requiring hospitals to reduce the risk of patient harm resulting from falls and to implement a falls-reduction program, and in 2010, this requirement was upgraded to a standard (American Nurse Today, 2011).

Nurses have significant experience in using evidence base practice, with a record dating back to the time of Nightingale (McDonald, 2001). Outcomes research is the key to knowing the quality of care that can be achieved, and how providers can move to that level of care (AHRQ, 2008b). Applying evidence to clinical nursing practice can improve patient outcomes and the quality of care (Mantzoukas 2009).

The PICO question identified for the Capstone Project expected that fewer adverse outcomes such as patient falls will occur by having fewer patients per nurse or more direct nursing care hours per patient day. Many strategies have been implemented to improve staffing and create innovative care delivery models. These strategies will be reviewed as part of the systematic review of the literature.

Theoretical Foundation

Identifying and maintain the appropriate number and mix of nursing staff was critical to the delivery of quality patient care. Studies have revealed an association between higher levels of experienced registered nurse (RN) staffing and lower rates of adverse patient outcomes (American Nurses Association, 2009). Needlman, J., Buerhaus, P., Pankratz, S., Leibson, C. L., Stevens, S. R. & Harris, M. (2011), wrote about nurse staffing to examine the relationship between mortality and day-to-day, shift-to-shift variations in unit level staffing in one hospital with lower-than-expected mortality and high average staffing. The study also analyzed mortality and the effect of patient turnover, defined as the admissions, discharges and transfers. The benefits of increased RN staffing have been demonstrated. Each additional patient care RN employed (at 7.8 hour per patient day) generated over $60,000 annually in reduced medical cost and improved national productivity (American Nurses Association, 2013).

Review of Evidence

A systematic review of the evidence (SRE) was done to ascertain supportive literature for an evidence-based intervention for the chosen population (see Appendix A). The systematic review of the literature consisted of an overview of primary research studies that were conducted according to explicit and reproducible methodology which provided a rigorous method of summarizing research evidence for the Capstone Project. Electronic databases, including Medline, CINAHL, Cochrane databases, BioMed Central, and American Nurses Association, Agency for Healthcare Research and Quality were searched. The search strategy used key words such as Mandatory Nurse-Patient Ratios, Nursing Outcomes, and Patient Falls. The total number of articles for Mandatory Nurse-Patient Ratios were 6 articles, the total number of articles found for keyword nursing outcomes were 1,025, and keyword patient falls yielded a total of 303. By combining the articles, 34 were found most informative.

A total of 34 journal articles were found to be relevant for inclusion in the SRE. From the Key Words such as nurse-patient ratio a total of 27 articles were directly related to nurse staffing (American Nurses Association, 2013; Douglas, 2010; Needleman et al., 2011; Reiter, Harless, Pink, & Mark, 2012; Stanton & Rutherford, 2004). Ten of the articles reviewed were directly related to patient safety, falls, quality of care, and outcomes (AHRQ, 2008b; Akyol, 2007; American Nurse Today, 2011; American Nurses Association, 2009; Unrah, 2008). The review of the literature found various descriptive studies, cross-sectional studies, retrospective observational studies, and descriptive cross-sectional studies in which data was extracted and a table of evidence created (Needleman et al., 2011; Kalisch & Lee, 2011).

The information was assembled, critically appraised, and the results synthesized addressing the issue on mandatory nurse-staffing ratios as it relates to adverse outcomes. For each relevant study, data were extracted systematically; however, many of the studies reported

different outcomes, different ways of summarizing the association between staffing and outcomes. Applying evidence to clinical nursing practice can improve patient outcomes and quality of care (Mantzoukas, 2009). However, the challenges of implementing change in clinical areas have been widely reported (Gerrish & Clayton 2004; Hutchinson & Johnston 2004; Solomon's & Spross, 2011).

Support for mandatory nurse-patient ratios is drawn from the belief that regulated registered nurse (RN) staffing will increase positive patient outcomes, decrease nursing shortages, and increase nurse recruitment and job satisfactions (Unruh, 2008). According to Blakeman Hodge and colleagues (2004), better RN staffing was key to patient care and nurse retention, while inadequate staffing endangers patients and drives nurses from their profession. Low staffing levels are associated with higher adverse outcome rates. Common adverse outcomes sensitive to nurse staffing, like urinary tract infections, pneumonia, pressure ulcers, and falls, can all lead to longer hospital stays and increased costs for hospitals (Stanton, 2004). The health care industry is the largest employer in the United States and ranks second among eight industries as having the highest percentage of claim costs associated with falls (The Joint Commission, 2009a).

Flynn and McKeown (2009) conducted a review of published evidence that revisits the evidence relating to how nurse staffing levels impact on patient, nurse, and service outcomes. They considered the implications of this body of research for nurse managers in their quest to determine optimum nursing numbers.

The refined searches produced a total of 584 systematic reviews and meta-analyses, research reports, literature reviews, and policy papers. The search covered a span of 10 years from 1998 to 2008 and identified more than 500 relevant papers that include an international

perspective. The reviews showed an association between nurse staffing levels and patient outcomes.

Lucero, Lake, and Aiken (2010) conducted a multivariate analysis, and collected data on nursing care quality and adverse events in U.S. hospitals and examined the association between the nurse's report of patients receiving the wrong medication or dose, nosocomial infections, and patient falls with injury. The researchers found that unmet nursing care needs were significantly associated with adverse patient events in acute care hospitals.

Kendall-Gallagher, Sloane, and Cimiotti (2011) conducted a national sample survey of registered nurses and compared data of nurses from this state with the national sample of nurses on demographics and work settings. The researchers found nurse staffing problems were perennial and universal based on history. Registered Nurses on the frontlines of care were increasingly burdened by changes in staffing, increased turnover, demands of their time, and the continual need for advanced knowledge and training.

Hurst and Smith (2010) conducted a non-participant observation document analysis on temporary nursing staff-cost and quality issues. They found short-term staff improved quality of care evident by fewer employee sick days. The researchers compared temporary and permanent staff work activity, cost, and quality of care. The researchers found workloads and time out in wards for agencies that employed temporary staff were greater than in units with permanent staff only, thereby justifying hiring short-term staff. Wards with temporary and permanent staff were more expensive and working styles were different. Overall quality scores, however were not different in the two types of wards.

Patient falls and injuries and how they relate to poor staffing issues were of great concern. The importance of beginning the study in January, 2013 was to review data to evaluate

any link between patient falls and any resulting injuries and poor nurse staffing ratios. It was equally important to identify if fall prevention improves patient care, results in fewer adverse events, and shorter length of stay, as well as lower mortality rates using a retrospective chart review.

Market/Risk Analysis

According to Clarke and Donaldson, (2008), a research tradition has existed in which nurse staffing factors were primarily background variables. Study of nurse staffing ratios and patient outcomes has emerged as a legitimate and strategically crucial field of inquiry. In the face of myriad pressures to adopt a position for or against mandated nurse-to-patient ratios, the state of the young science does not permit precision in prescribing safe ratios. In fact, it may be concluded further research is crucial to tease out the nuances in the staffing-outcomes equation.

Some of the barriers that affect fixed nursing ratios were not accounting for patient acuity, nor for the circumstances within which nurse's work. Both affect the staff's ability to take good care of a patient population (Welton, 2007). Overall the nursing-ratio imbroglio appears to be a significant barrier to achieving the levels of workforce stability, fiscal efficiency, staffing morale, and patient-care outcomes demanded by a new era of health care reform and reorganization.

SWOT Analysis

Strategic planning has become the practical approach to organizational management in most organizations in the new era, when the world has undergone major social, political, economic, technological, and demographic changes. Bell (2002) stated, "At its simplest strategic planning may be understood as an approach to establishing the long-term future of an organization and then moving that organization in an appropriated direction to achieve the future

state to which its member, or at least its key members aspire" (p. 407). The purpose of strengths, weaknesses, opportunities, and threats (SWOT) analysis was to develop the analysis for the capstone project as shown in Table 1. The SWOT analysis focuses on internal strengths and weaknesses and external opportunities and threats. From a marketing perspective, the service delivery environment is a critical element to a customer's total service experience (O'Malley, 2004). SWOT analysis according to Cleverley, Song, & Cleverley (2011) is a technique to evaluate an organization's strengths, weaknesses, opportunities, and threats. This technique often is used as part of the strategic planning process.

For a SWOT analysts strengths and weaknesses are identified when analyzing the internal business drivers/impacts (Department of Health and Human Services Tasmania, 2011).

- Strength is a distinctive competence of the service.
- Weakness is a deficiency that limits the performance of the service.
- Opportunity is a factor external to the service that presents an area of potential for the service.
- A Threat is an unfavorable factor in the external environment.

Table 1

SWOT Analysis

Strengths
• Leadership proficiency • Increased knowledge in evidence-based practice (EBP). • Increased information in technology. • Inter-professional collaboration skills. • Expert Clinician knowledge. • Inspire continued trust and confidence • Process Improvement • Stimulate Reform

Weaknesses • Variations in Unit-level data reports compared with staffing data reported in administrative databases such as payroll.
Opportunities • Enhance patient safety. • Assuring outstanding patient experiences. • Decrease patient falls. • Improve nurse-patient ratios. • Higher performing nursing team.
Threats • Lack of administrative support. • Time constraints. • Lack of nurse's participation in survey. • Lack of awareness by policymakers. • Support from administration for additional nurses • Increased cost for hiring and maintaining a higher nurse to patient ratio.

Driving and Restraining Forces

Patient falls, injuries, and how they relate to poor staffing issues are of great concern to the agency. It was important to initiate the study and review data to evaluate links between patient falls and resulting injuries related to poor nurse staffing ratios. Using a retrospective chart review, it was important to identify if fall prevention improves patient care, results in fewer adverse events, and shorter lengths of stay, as well as lower mortality rates. Despite mandated attempts to ensure adequate staffing, fluctuations in patient needs and available staff can result in understaffing and jeopardize patient safety. Nurses were overwhelmed with so many challenges that affected the professional care to patients and families such as the current nurse-to-patient

ratios, and patient satisfaction scores. Nurses are held to a higher standard of care in which they must fulfill the commitment to a culture of safety, and a positive nursing practice environment.

Reliability and Validity

Injurious fall rates were determined in a similar manner using the Safety Event Manager which is the core application of the Quantros version 5.10 Safety and Risk Management (SRM) solution. Patient, employee, and visitor safety events were entered into Safety Event Manager. The application then manages, tracks, and analyzes this information so that the organization can address events and potential issues. The southern hospital participating in the study used the Safety Event Manager to reduce adverse events through: Comprehensive reporting capabilities that provided actionable safety and quality of care data. The data collected for the study was used to identify actual issues and nursing concerns with the current staffing matrix as it relates to nurse-patient ratios and outcome measure related to patient falls. The reliability and validity of Safety Event Manager was utilized as a, public-use safety culture instrument that hospitals can administer on their own to assess the patient safety culture from the perspective of their employees and staff. Quantros version 5.10 Safety and Risk Management (SRM) used historical data to optimize decision making, and delivered data in real-time to decision makers which establishes the validity of the data. According to (Kim et al., 2011), the highest predictive validity for identifying patients at high risk for falls was achieved by the Morse Fall Risk Assessment Tool.

The safety and quality of patient care was directly related to the size and experience of the nursing workforce. Inpatient working conditions have deteriorated in some facilities because hospitals have not kept up with the rising demand for nurses. This situation has motivated some state legislatures to enact or consider regulatory measures to assure adequate staffing. These

regulatory measures assign some minimum level of staffing that all hospitals must meet regardless of the types and severity of patients.

Stakeholder and Project Team

The issue of mandatory nurse-patient ratios remained controversial among many vested stakeholders, including nurses, patients, physician, unions, nursing organization, lobbyists, researchers, employers (in particular, hospitals), and federal and state governments (Douglas, 2010).

In December of 2001, the California Healthcare Foundation and the University of California, San Francisco (UCSF) Center for the health professions convened a day long "strategic conversations" to better understand various stakeholder perspectives on the evolving nursing crisis. The forum brought together representatives of educational institutions, organized labor, professional associations, and delivery sites to identify barriers to progress and suggest potential courses of action (California Healthcare Foundation: Issue Brief, 2002). The California Healthcare Foundation worked as a catalyst to fulfill the promise of better health care for all Californians. They support ideas and innovations that improve quality, increase efficiency, and lower the cost of care. Their strong mission statement was a catalyst for this research study and decision to use the target agency.

The capstone project team consisted of the DNP Student, Clinical Mentor, Capstone Chair, and Capstone Faculty, along with the participation from the nursing staff working on the medical surgical unit. In a spirit of teamwork, the team pulled together to create a working environment in which communication and collaboration was encouraged. The team worked diligently on the project as timelines were present and followed.

Cost / Benefit Analysis

The costs associated with mandated ratios that provide for additional RNs will not be offset by additional payment to hospitals. Provisions for additional nurses may result in mandates that will be unfunded. An alternative approach to funding additional nurses would be to provide a market-based incentive to hospitals to optimize nurse staffing level by unbundling nursing care from current room and board charges, billing for nursing care time for individual patients, and adjusting hospital payments for optimum nursing care (Welton, 2007).
In the current system, hospitals allocate all patient care expenses to specific categories or cost centers that map to the Medical Cost Report (Centers for Medicare & Medicaid Services, 2005; Centers for Medicare & Medicaid Services, 2006).

Direct nursing cost was allocated to one of only two accommodation cost centers: routine (floor) care and intensive care. Total nursing costs were collected and then averaged and standardized as nursing costs per patient per day. As direct nursing care hours and costs were highly correlated with nursing outcomes. This accounting approach implied that all patients within either the routine or intensive cost centers receive the same level of nursing care and does not account for patient acuity (Welton, 2007).

The benefits of appropriate nurse staffing was critical to patient safety and well-being. Inadequate nurse staffing levels were known to influence the rate of heart attacks, falls, medication errors, and respiratory infections, as well as overall mortality. The study suggested that higher nurse staffing and richer skill mix were associated with improved patient outcomes on the medical/surgical unit by evidence of fewer patient falls (see Appendix J).

Sound nurse staffing requires a long-term organizational commitment to empower and appreciate the contribution of nurses. Hospitals must take into account such variables as patient

acuity, unit layout, and ancillary support in determining the appropriate number, skills, experience, specialized training, and education of nurses on the medical surgical unit.

Project Objectives

Goal of the Capstone Project

The goal for the Capstone Project was to determine if mandatory nurse-patient ratios for RN staffing will increase positive patient outcomes, decrease nursing shortages, and increase nurse recruitment and job satisfactions (Unruh, 2008).

Mission/Vision

The mission for this capstone project was to strive for nursing excellence, safety, and quality health care to each patient admitted to the facility. Adequate nurse staffing was key to patient care and safety and nurse retention, while inadequate staffing endangers patients, and drive nurses from their profession.

The vision for this capstone project was to emphasize the importance of nurse staffing to the delivery of high-quality patient care.

Objectives

The objective of the study was to review data to evaluate links between patient falls and resulting injuries and poor nurse staffing ratios.

Evaluation Plan

Logic Model

The conceptual model chosen for the Capstone Project was adapted from the Logic Model (Zaccagnini & White, 2011) (see Appendix B). The formal modeling was conducted using mixed linear models for which each patient outcome was related to the facility studied. Hospital and unit structure variables were included in the analysis of Patient Falls (see Table 2).

The Logic Model Development is a systematic and visual way to present and share the nurse's understanding of the relationships among the resources designed to operate a program, the activities planned, and the changes or results achieved (Kellogg, 2004). A well-accepted definition of evidence-based medicine is "the integration of best research evidence with clinical expertise and patient values" (Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000, p. 1). Reaching beyond medicine, this definition is preferred because it addresses clinical expertise and patient values in addition to the best evidence.

Table 2

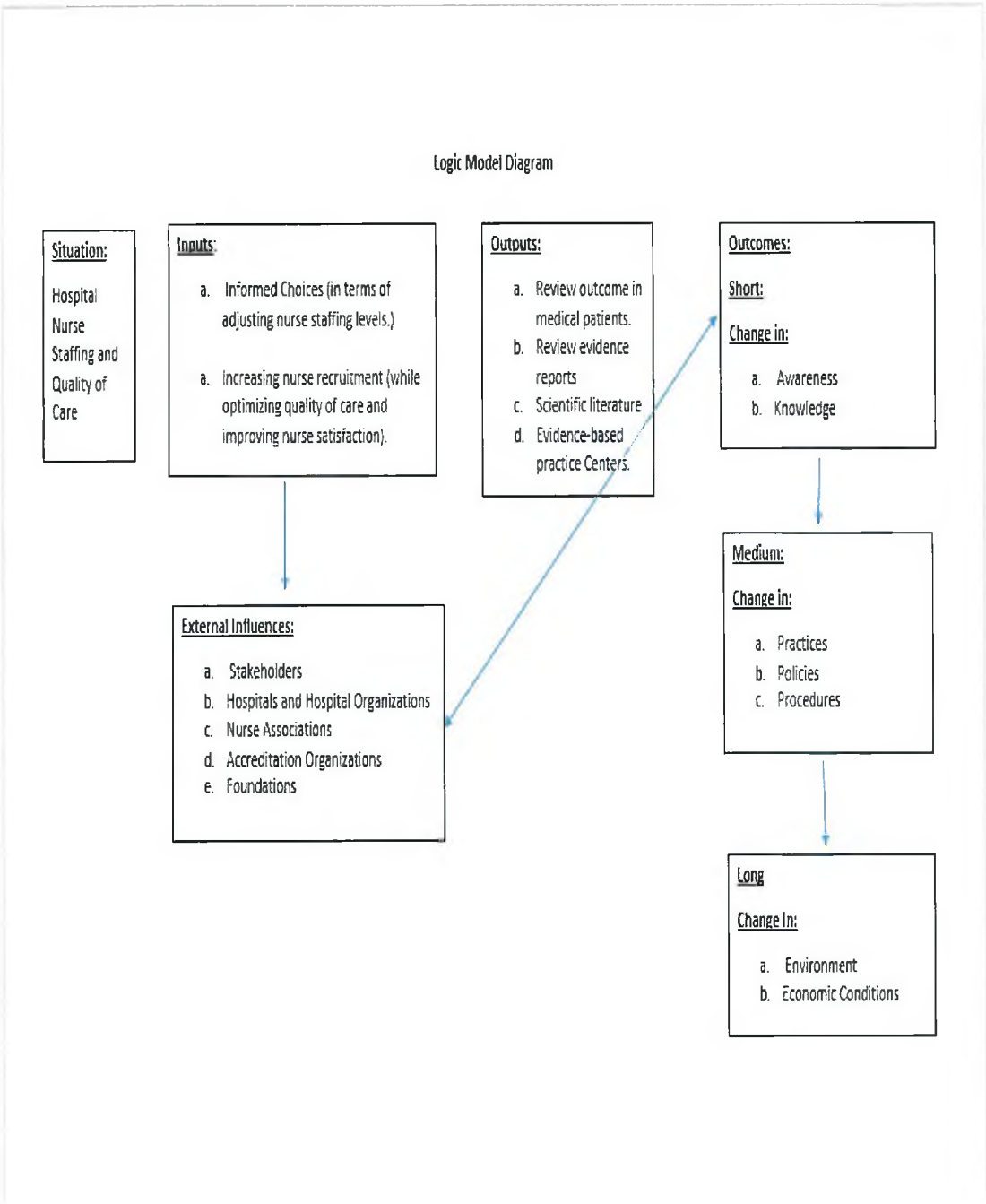
Hospital and Unit Structure Variables in the Analysis of Patient Falls.

Hospital Structure	Unit Structure	Patient Outcomes
118 Staffed Beds 52 Medical / Surgical Beds	Total Nursing Hours per Patient Day	Total Falls per 1,000 Patient Days
	RN Hours Per Patient Day	
	Skill Mix	
	Percent of Total Nursing Hours Supplied by Agency Staff	
	Percent of RNs with a BSN or Higher Degree	
	Years of Experience in Nursing	
	Unit Type Medical /Surgical Unit	

The situation was "Hospital Nurse Staffing and Quality of Care" (AHRQ, 2008b). The inputs used in the model were informed choices in terms of adjusting nurse staffing levels, and increasing nurse recruitment while optimizing quality of care and improving nurse satisfaction. The outputs were done as a review of outcomes in medical patients, and review of evidence reports. What was reached were scientific literature, and evidence base practice centers. Some of the external influences were stakeholders, hospital and hospital organizations, nurse

associations, accreditation organizations, and foundations. Outcomes can be either short, medium, or long. The short outcomes changed awareness and knowledge, the medium outcomes change practice, policies, and procedures. The long outcomes changed the environment and economic conditions (see Table 4).

Table 4 Logic Model Diagram.



Evaluation Plan

Evidence Based Practice Study Methodology

The Capstone Project was a retrospective descriptive study directed at reviewing data and examining the relationship between patient falls and staffing effectiveness specifically nurse to patient ratios on a busy medical/surgical unit. Data was analyzed by reviewing charts of high fall risk patients admitted during the time frame of 3 months beginning January 01, 2013 through March 31, 2013 on the medical/surgical unit at a small hospital in the Southern area of the country. Nurses participating in the study were given a letter of consent, and a nursing questionnaire taking approximately10 minutes to complete (see Appendices H & C). The study questionnaire consisted of 10 true and false questions that pertained to current staffing practices to determine the attitudes of nursing personnel regarding patient safety and an increase in patient falls. A pre-test was administered to 5 RNs as a pilot prior to the study for their feedback about the instrument and no modifications were made as a result. The questionnaire was administered to the sample of RNs and the result was analyzed by percentages and reported as aggregated data (see Appendix D). Patient falls were compared with RNs staffing on a 12 hour shift. A staffing matrix was utilized to determine target staffing from each shift on the medical/surgical unit. Unit and shift measures included the specific unit and unit type to which the patient was admitted and the shift of admission: day, evening, or night shift (see Appendix E). Chart audits were conducted over the three month period reviewing data on high fall risk patients using the Morse Fall Risk Scale Screening Tool (see Appendix F). The Morse Fall Risk Scale Screening Tool was used to adjust for the risk of patient falls. The fall rates were determined by using data from incident reports, fall evaluator, and combined data from incident reports and the fall evaluator.

Patient-days were determined for each nursing unit using hospital billing data. All fall rates were calculated as (number of fall events/patient-days) x 100.

Injurious fall rates were determined in a similar manner using the Safety Event Manager which is the core application of the Quantros version 5.10 Safety and Risk Management (SRM) solution. Patient, employee, and visitor safety events were entered into Safety Event Manager. The application then manages, tracks, and analyzes this information so the organization can address events and potential issues. The southern hospital participating in the study used the Safety Event Manager to reduce adverse events through: Comprehensive reporting capabilities that provided actionable safety and quality of care data. The data collected for the study was used to identify actual issues and nursing concerns with the current staffing matrix as it relates to nurse-patient ratios and outcome measure related to patient falls.

Patient, employee, and visitor safety events were entered into Safety Event Manager. The application managed, tracked, and analyzed this information so that the organization could address events and potential issues. The organization used Safety Event Manager to reduce adverse events through: Comprehensive reporting capabilities that provide actionable safety and quality of care data.

Study Intervention

The study intervention took place from January 2013 through March 2013. This retrospective study explored patient staffing ratios and nurse's perception of the causes of patient falls in relation to actual patient falls. A combination of a retrospective review of patient fall data and a nurse questionnaire was designed to allow for an exploration of patient staffing ratios and nurse perceptions of patient falls in relation to actual patient falls.

Plan for Data Analysis

Data was analyzed using the Quantros version 5.10 Safety and Risk Management (SRM) solution. The Morse Fall Risk Screening Tool was used to adjust for the risk of patient falls. The fall rates were determined by using data from incident reports, fall evaluator, and combined data from incident reports and the fall evaluator. Patient-days were determined for each nursing unit using hospital billing data. All fall rates were calculated as the (number of fall events/patient-days) x 100. Injurious fall rates were determined in a similar manner using the Safety Event Manager which was the core application of the Quantros version 5.10 Safety and Risk Management (SRM) solution.

Timeframe

The application to the Regis Institutional Review Board (IRB) for Capstone Project "*What is the evidence that adding registered nurses to unit staffing will have on positive patient outcomes in the acute care setting?*" was approved as an exempt study on March 1, 2013. Data for the retrospective study was collected over three months beginning December 1, 2013 through March 31, 2013 (see Appendix L).

Budget and Resources

No funding was provided for this project, nor any costs or payment to the participants that consented to participate in the exempt study. The Chief Nursing Officer gave permission on behalf of the hospital to allow the exempt retrospective study to take place at the agency (see Appendix K). The total cost of the study to the author is noted in Table 3 (see Appendix M).

Table 3 Cost of the Study.

Item	Cost
IBM SPSS Statistics Base Grad Pack; Version 21.0	$136.00

Copier Paper for Handouts	$25.00
Total Cost	$161.00

Protection of Human Rights

The research conducted was an exempt study in which the risk to study participants was minimal. Subjects were recruited by the use of a Cover Letter that explained the purpose of the study and the subject's role in participation (see Appendix H). Information obtained was not recorded in such a manner that human subjects could be identified directly or through identifiers linked to the subjects. The exempt study involved the collection of existing data, documents, and records in which the information would be recorded in such a manner that the subjects could not be identified directly. All data results were reported as aggregate data. Application for exempt approval of research involving human subject's proposal was approved by Regis University Internal Review Board (IRB) (see Appendix I). Study investigator received ethics certification after successful completion of the Collaborative Institutional Training Initiative (CITI) human research curriculum for social behavioral research investigators (see Appendix G).

Informed Consent

Subjects were informed that participation was voluntary; refusal to participate would not involve a penalty or loss of benefits to which thee were entitled; and the subject could discontinue participation at any time without penalty or loss of benefits to which they were entitled (Smith & McGuire, 2005). Filling out the nursing questionnaire constituted consent to participate in the study (see Appendix H).

A letter of consent was given to the RNs participating in the study in which their anonymity and confidentiality of their responses would be protected. Participation in the study

was voluntary and the nurse could withdraw at any time. The RNs were also informed if they felt uncomfortable answering any question or concerns about the study they could choose not to answer a question. Participants were also informed that choosing not to participate would not affect their goods or services or employment in any way. There was no direct benefits to them participate in the study. Participation in the study took approximately 10 minutes of time to complete and had no cost to them.

Confidentiality of data

All data results were reported in aggregate data. The information collected was kept in a locked file cabinet and will be kept for three years, then shredded.

Additional Ethical Consideration

A portion of this study was a retrospective study and data collected by analyzing chart records that involved the collection and study of existing data. The study also involved the use of survey procedures, interviews procedures, or observation of public behavior. The sources for data collection were publicly available or was recorded in such a manner that subjects could not be identified, directly or through identifiers linked to the subjects. Individual patients were not identified and every attempt was made to keep patient information confidential. The facility where the research was conducted was not identified.

Analysis

Data was compiled over three months in a descriptive and retrospective manner. A total of 20 RNs participated in the study by completing the Nurse Staffing Questionnaire. The questionnaire contained 10 questions in which the nurses marked True or False for each question in the space provided. The test took approximately 10 minutes. The Nurse Staffing Questionnaire was administered to a total of 20 registered nurses and the results were analyzed

by percentages and reported as aggregate data. The results for the Nursing Questionnaire was summarized in percentages for practicing nurses' perceptions of staffing (see Appendix D). One hundred percent of nurse s viewed staffing as an important factor to protect patient safety. Seventy-five percent of nurses answered that inadequate staffing is a complex problem that generates cyclical patterns over years. One hundred percent of nurses agreed that research has linked higher staffing levels and better patient outcomes. Ninety percent answered that current staffing did not allow time for unexpected events to occur. Eighty percent of the nurses felt that changes in skill mix and/or layoffs of hospital personnel had a negative effect on patient care. One hundred percent of the nurses felt that basic principles of staffing should be based on patient care needs, the severity of conditions, services need, and the complexity surrounding those services. Eighty-five percent of the nurses felt that quality of patient care is jeopardized because of staffing changes implemented in response to managed care. One hundred percent of the nurses felt they must be accessible and available to meet the needs of the patients. One hundred percent of the nurses felt that safe RN-to-patient ratios reduce the number of patient complications. One hundred percent of the nurses felt that poor RN-to-patient ratios increase nurse turnover, cost money, and lower profitability for the facility.

Over the three month period when data was collected, patient falls were compared with registered nurse staffing on a 12 hour shift on the medical/surgical unit (see Appendix E). Unit and shift measures included the unit and unit type to which the patient was admitted and the shift of admission: day, evening, or night shift. The Morse Fall Risk Screening Tool was used to adjust for the risk of patient falls (Morse, 2009) (see Appendix F). Fall rates were determined using data from incident reports, fall evaluator, and combined data from incident reports and the fall evaluator.

Injurious fall rates were determined in a similar manner using the Safety Event Manager which is the core application of the Quantros version 5.10 Safety and Risk Management (SRM) solution. Patient, employee, and visitor safety events were entered into Safety Event Manager. The application tracked and analyzed data so the organization could address events and potential issues. The study used the Safety Event Manager to reduce adverse events through comprehensive reporting capabilities that provided actionable safety and quality of care data. The data collected for the study were used to analyze actual issues and nursing concerns with the current staffing matrix as it relates to nurse-patient ratios and outcome measure related to patient falls (see Appendix E & F). The fall rate average for the three month period were four falls per month. The average total for men falling were 3 and the average total for women falling were 2. The average age of the patients were between 71-80 years of age. The average time frame of the falls varied for time of day. After reviewing charts for the patients who fell, a moderate risk for fall score was between, 25-44. The total number of registered nurses working on the nights the falls occurred averaged to be a 6:1 ratio in which the incidents occurred (see Appendix E). Data analysis revealed no significant differences in the patient falls and nurse staffing ratios ($p>.05$) (see DataSet1). Although, when the falls occurred, the researcher noted in the records that hourly rounding on patients had been conducted by the nurses. After conducting chart reviews the documentation revealed that patients who fell during this time frame were wearing their yellow fall risk bracelet, yellow skid socks, bed alarms in place, call light in reach, and beds in low position documented per Fall Policy and Procedure for this hospital.

Analysis Conclusions

The nurse staffing questionnaire results indicated the nurses who participated in the study felt that nursing is an important factor in protecting patient safety and maintaining positive

patient outcomes. Poor RN-to-patient ratios were believed to increase the number of patient complications. No significant differences existed when falls were compared with nursing staffing ratios.

Limitations

1. Lack of increased funding for patient care was one drawback that existed to the regulatory approach where state law mandates staffing ratios. Hospitals patient care fees did not increase to offset the cost of increasing nurses to meet mandatory ratios.
2. A retrospective study looked back at past data and the actual current data may have changed as a result of input from patient satisfactions scores.
3. The low response rate to the nursing questionnaire posed a limitation. The nurses were busy and many could not complete the questionnaire due to time constraints.
4. The sample size was small and the results cannot be generalized to the greater population.

Recommendations

1. Hourly rounding be mandatory on the medical surgical unit in which the staff member actually scan their badge each time they enter the room and weekly audit be conducted from the actual scans by the department manager and reported to the Risk Fall Champion.
2. From the Literature Review one recommendation would be making professional development and assessment of competency a routine part of care.
3. Further study is needed on patient acuity systems and staffing ratios to determine optimal conditions for patient safety.
4. More research is needed with a larger sample size on the perceptions of nurses regarding staffing ratios and fall prevention.

Conclusion

Fall occurrence during hospital stays was well recognized as a nursing-sensitive outcome indicator (American Nurses Association ANA, 2008). The consequences of falls include devastating, self-imposed limitations on activities, anxiety, and early admission to nursing homes (Akyol, 2007). Fall-prevention programs for hospitalized patients have had limited success because not only do patients have increasingly complex disorders or functional deficits, but staff often fail to consider risks such as a patient's tendency to overstep physical limitations (Jeske et al., 2006). Staff's responsiveness to call lights was identified as one of the human factors related to fall-prevention efforts (Tzeng & Yin, 2008). Medicare no longer reimburses hospitals for the costs of additional care required due to hospital acquired injures (CMS, 2008). The Affordable Care Act emphasizes pay-for-performance to reduce events that harm patients (Tseng et al, 2011).

Hospital inpatient falls consistently compose the largest single category of reported accidents (Joint Commission, 2005). More research is needed to identify meaningful quality improvement approach such as fewer patient per nurse to achieve fewer patient falls.

Providing a culture of safety and a positive nursing practice environment is an important organizational strategy. A nurse who has knowledge that a situation places a patient at risk of harm has a duty to the patient to take action (Texas Board of Nursing, 2008).

The study suggests patient acuity and nurse-to-patient ratios be monitored on a shift-to-shift, day-to-day basis and be included as a nursing sensitive indicator as it relates to patient safety to determine optimal conditions for safe patient care. After data are collected, hospital systems can review the results of the data and make better staffing decisions for the institution.

References

AHRQ. (2008b). Outcomes research fact sheet. Retrieved from http://wwwahrq.gov/clinic/outfact.htm.

Akyol, A. D. (2007). Falls in the elderly: What can be done? *International Nursing Review, 54(2)*, 191-196.

American Association of Colleges of Nursing. (2006). *The essentials of doctoral education for advanced practice nursing.* Washington, DC: Author.

American Nurse Today (2011). Special Supplemental to American Nurses Today-Best Practices for Falls Reductions: A Practice Guide. Retrieved from http://www.americannursetoday.com.

American Nurses Association (2009). Nursing-sensitive indicators. Retrieved from http://www.nursingworld.org.

American Nurses Association (2013). Nurse staffing plans and ratios. Retrieved 06/26/2013, from http://www.nursingworld.org.

Becker, M. K., & Neuwirth, J. M. (2002). Teaching strategy to maximize clinical experience with beginning nursing students. *Journal of Nursing Education, 41*, 89-91.

Bell, L. (2002). Strategic planning and school management: Full of sound and fury, signifying nothing? *Journal of Educational Administration, 40*(4), 407-424.

Blakeman Hodge, M., Romano, P. S., Harvey, D., Samuels, S. J., Olson, V. A., Sauve, M. J., & Kravitz, R. L. (2004). Licensed caregiver characteristics and staffing California acute care hospital units. *Journal of Nursing Administration, 34*(3), 125-133.

California Healthcare Foundation: Issue Brief (2002). Stakeholder perspective on California's nurse staffing crisis, 1-6.

Centers for Disease Control and Prevention, National Center for Prevention and Control (2011). Web-based Injury Statistics Query and Reporting System (WISQARS) [ONLINE] retrieved from http://www.cdc.gov.

Centers for Medicare & Medicaid Services (2005). Hospital cost report. Retrieved from http://www.cms.hhs.gov/data/download/hcris_hospital/default.asp.

Centers for Medicare & Medicaid Services (2006). Acute inpatient pps: Details for CCRs and weighting factors. . Retrieved from http://www.cms.hhs.gov/AcuteInpatient PPS/FFD/itemdetail.asp?filterType=non&filterByDID=-99&sortBy DID=2&sortOrder=ascending&itemID=CMS061892.

Centers of Medicare & Medicaid Services (CMS), (2008*). Changes to the hospital inpatient .prospective payment systems and fiscal year 2009 rates.* Retrieved from http://www.cms.hhs.gov/AcuteInpatientPPS/downloads/CMS-1390-F.pdf.

Clarke, S. P., & Donaldson, N. E. (2008). Nurse staffing and patient care quality and safety. In R. G. Hughes (Ed.), *Patient Safety and Quality: An Evidence-Base Handbook for Nurses* (1-25).

Cleverley, W. O., Song, S. H., & Cleverley, J. O. (2011). *Essentials of health care finance*. (7th ed.). Columbus, OH: Jones and Bartlett Learning.

Department of Health and Human Services Tasmania (2011). Safe Staffing retrieved from http://www.dhhs.tas.gov.

Douglas, K. (2010). Ratios-If it were only that easy. *Nursing Economics*, *25*(2), 119-125.

Gerrish, K., & Clayton, J. (2004). Promoting evidence-based practice: an organizational approach. *Journal of Nursing Management*, *12*(2), 114-123.

Hughes, R. G. (Ed.). (2008). Nurse staffing and patient care quality and safety. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses.* Rockville, MD: Agency for Healthcare Research and Quality (US), retrieved from http://www.ahrq.gov.

Hutchinson, A., & Johnston, L. (2004). Bridging the divide: A survey of nurses' opinions to, and facilitators of, research utilization in the practice setting. *Journal of Clinical Nursing*, *13*(3), 304-315.

Jeske, L., Kolmer, V., Muth, M., Cerns, S., Moldenhaur, S., & Hook, M. L. (2006). Partnering with patients and families in designing visual cues to prevent falls in hospitalized elders. *Journal of Nursing Care Quality*, *21*(3), 236-242.

Joint Commission (2005). *Defining the problem of falls.* In I. J. Smith (ED.), *Reducing the risk of falls in your health care organization* (pp.13-27). Oakbrook Terrace, IL: Joint Commission.

Kalisch, B. J., & Lee, K. H. (2011). Nurse staffing levels and teamwork: A cross-sectional study of patient care units in acute care hospitals. *Journal of Nursing Scholarship*, 43(1), 82-88.

Kellogg, W. K. (2004). A Template for the DNP scholarly project. In *The Doctor of Nursing Practice Essentials A New Model for Advanced Practice Nursing* (pp. 449-493). Sudbury, MA: Jones and Bartlett.

Kim, K. S., Kim, J. A., Choi, Y. K., Kim, Y. J., Park, M. H., Kim, H. Y., & Song, M. S. (2011). A comparative study on validity of fall risk assessment scales in Korean hospitals. *Asian Nursing Research*, *5*(1), 1-37.

Lake, E. T., Shang, J., Klaus, S., & Dunton, N. E. (2010). Patient falls: Association with hospital magnet status and nursing unit staffing. *International Journal Evidence Based Health Compilation*, *33*, 413-425.

Mantzoukas, S. (2009). The research evidence published in high impact nursing journals between 200 and 2006: A quantitative content analysis. *International Journal of Nursing Studies*, *46*(4), 479-489.

McDonald, L. (2001). Florence Nightingale and the early origins of evidence-based nursing. *Evidence-Based Nursing*, *4*, 68-69.

Needleman, J., Buerhuas, P., Pankrantz, S., Leibson, C. L., Stevens, S. R., & Harris, M. (2011). Nurse staffing and inpatient hospital mortality. *The New England Journal of Medicine*, *364*, 1037-1045.

O'Malley, J. (2004). The Total Service Experience. *Marketing Health Service*, 12-14.

Reiter, K. L., Harless, D. W., Pink, G. H., & Mark, B. A. (2012). Minimum nurse staffing, legislation and the financial performance of California hospitals. *Journal of Health Research and Educational Trust*, 47(3), 1030-1050.

Sackett, D. L., Straus, S. E., Richardson, W. S., Rosenberg, W., & Haynes, R. T. (2000). *Evidence-based medicine: How to practice and teach evidence-based medicine*. London: Churchill Livingstone.

Smith, M. M., & McGuire, M. (2005). *The Legal Environment.* In Indianapolis, The College Network, retrieved from http://www.colleg-net.com.

Solomons, N., & Spross, N. (2011). Evidence-based practice barriers and facilitators from a continuous quality improvement perspective: an integrative review. *Journal of Nursing Management*, *19*(1), 109-120.

Stanton, M. W., & Rutherford, M. K. (2004). Hospital nurse staffing and quality of care. Rockville, MD: Agency for Healthcare Research and Quality; 2004. Research in Action Issue 14. Agency *for Healthcare Research and Quality (AHRQ)* Pub. No 04-0029.

Texas Board of Nursing (2008). When does a nurse's duty to a patient begin? *Texas Board of Nursing Bulletin, 39*(4), 7, 9.

The Joint Commission for Accreditation of Health Care Organizations (2009). National patient safety goals. Retrieved from http://www.jointcommission.org.

Tzeng, H. M., & Chan, Y. Y. (2008). Nurses' solutions to prevent inpatient falls in hospital patient rooms. *Nursing Economics, 26*(3), 179-187.

Tzeng, H. M., Hu, H. M., & Yi Yin, C. (2011). The relationships of the hospital-acquired injurious fall rates with the quality profile of a hospitals care delivery and nursing staff patterns. *Nursing Economics, 29*(6), 299-306.

Tzeng, H. M., & Yin, C. Y. (2008). The extrinsic risk factors for inpatient falls in hospital patient rooms. *Journal of Nursing Care Quality, 23(3)*, 234-242.

Unrah, L. (2008). Nurse Staffing and patient, nurse, and financial outcomes. *American Journal of Nursing, 108*(1), 62-71.

Welton, J. (2007). "Mandatory hospital nurse to patient staffing ratios: Time to Take a Different Approach". *The Online Journal of Issues in Nursing, 12*(3), 1-12.

Zaccagnini, M. E., & White, K. W. (2011). A Template for the DNP Scholarly Project. In *The Doctors of Nursing Practice Essentials. A New Model for Advanced Practice Nursing* (pp. 451-490), Sudbury, MA: Jones and Bartlett.

Appendix A

Evidence Table Systematic Review

ystematic Review Evidence Table Format [adapted with permission from Thompson, C. (2011). Sample evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), *Evidence-based practice: An implementation guide for healthcare organizations* (p. 155). Sudbury, MA: Jones and Bartlett.]

rticle Title and ournal	Nurse Staffing and Inpatient Hospital Mortality, The New England Journal of Medicine	Nurse staffing levels revisited: a consideration of key issues in nurse staffing levels and skill mix research, Journal of Nursing Management.	Evaluation of the organization and delivery of patient-centered acute nursing care, Contemporary Nurse Journal.	Life support For Hospital Staff, Industrial Engineer Journal.	Changing the model of care delivery: nurses perceptions of job satisfaction and care effectiveness, Journal of Nursing Management.	The Effect of Minimum Nurse Staffing Legislation on Uncompensated Care Provided by California Hospitals	Nurse Staffing Reductions in Pennsylvania Hospital: Exploring the Discrepancy between Perceptions and Data, Medical Care Research and Review.
uthor/Year	Needleman, J., Buerhaus, P., Pankrantz, S., Leibson, C. L., Stevens, S. R., Harris, M. (2011).	Flynn, M., McKeown, M. (2009).	Haigh, C., Ormandy, P. (2011).	Stansfield, T. C., Massey, R., Manuel, J. (2011).	Wells, J., Manuel, M., Cunning, G. (2011).	Reiter, K. L., Harless, D. W., Pink, G.H., Spetz, J., Mark, B. (2010).	Unruh, L. (2002).
atabase and eywords	Regis University D-20 nejm.org, Nurse Staffing, Inpatient Hospital, Patient Mortality.	Nurse Staffing Levels, Nurse Workforce, Outcomes, Skill mix, Staff-patient ratios.	Organization of care; delivery of care; acute settings; workforce.	Healthcare Organization; Nurse Staffing; Nurse Staffing Model; Outcomes; Nurse-Patient-Ratios	Care delivery models, change, job satisfaction, total patient care.	Uncompensated care, nurse staffing, California	Hospital Nurse Staffing; Reductions; Discrepancy; Perceptions; Data.

Research Design	Cross-sectional study	Review of published evidence relating to how nurse staffing levels impact on patient, nurse and service outcomes and considers the implications of the body of research for nurse managers in their quest to determine optimum nursing numbers.	A combination of qualitative and quantitative methods was applied in two stages to address the research objectives. SSM was used as a framework for the research process. This method facilitates the development of a theoretical model and identification of concepts which in this case refer to the organization and delivery of nursing care.	Research study to review current challenges in clinical healthcare staffing conducted by Industrial engineering professors at the University of Arkansas.	A mixed method, longitudinal, descriptive design was used.	The framework for this study draws form existing economic models of hospitals supply of uncompensated services. The Conceptual model of the effect of AB394 on hospital uncompensated care.	Research objectives are to describe the mean and variation in the percentage change of various measures of nursing staff in Pennsylvania general, acute-care hospitals from 1991 to 1997 and to ascertain what percentage of hospitals experienced varying degrees of reductions in nursing staff in that time period.

							that the means of changes in nursing staff understate the declines.
						The purpose of this study is to investigate the effect of California's minimum nurse staffing legislation on uncompensated care. Results of this study have important implications for patients, hospital executives, and state and federal health policy makers as they consider minimum nurse staffing legislation and community benefits.	When adjusted for patient severity and outpatient care, 50 percent of the hospitals experienced large decreases in RNs per patient days of care, 70 percent had large decreased in LPNs per patient days of care, and 56 percent had large declines in licensed nurses per patient days of care. Overall, finding support perceptions of a decline in licensed nurse staffing.
		The literature suggest that there are a number of deleterious consequences associated with inadequate workforce planning, with lower numbers of registered nurses often associated with worsened patient outcomes.	This paper reports the findings on one phase of a multi-phase study and focuses upon the perceptions and experiences of the hospital staff around the organization and delivery of patient-centered acute nursing care.	Researchers at the University of Arkansas Center for Innovation in Healthcare Logistics found that 68 percent of survey respondents were moving toward integrating global data standards into their supply chain.	Empirical data related to TPC is limited and inconclusive. Similarly, evidence demonstrating nurses' experience with change and restructuring is limited.		
Level of Evidence	Association between the level of in-hospital staffing by registered nurses and patient mortality.						

Study Aim/Purpose	Underscores the flexible staffing practices that consistently match staffing to need throughout each patient's stay.	This paper revisits the published evidence relating to how nurse staffing levels impact on patient, nurse and service outcomes and considers the implications of this body of research for nurse managers in their quest to determine optimum nursing numbers.	The key driver for this study arose from two serious untoward incidents that occurred in a large district general hospital in the United Kingdom.	Healthcare Organizations are under tremendous pressure to contain cost, advance healthcare delivery, improve customer service and manage the complexities within their healthcare business model.	To examine nurses perception of job satisfaction, empowerment, and care effectiveness following a change from team to a modified total patient are delivery model.	The study asses whether California's minimum nurse staffing legislation affected the amount of uncompensated care provided by California hospitals. The authors conclude that minimum nurse staffing ratios may lead some hospitals to limit uncompensated care, likely due to increased financial pressure.	Previous research has not confirmed public and practitioner perceptions of a decline in hospital nurse staffing. One reason for this discrepancy is that aggregate or mean values may not be an accurate description of the situation in a sizable percentage of hospitals.

Population Studied/Sample Size/Criteria/ Power	Registered Nurses	Registered Nurses	Registered Nurses	Registered Nurses	Registered Nurses	Registered Nurses	Research objectives are to describe the mean and variation in the percentage change of various measures of nursing staff in Pennsylvania general, acute-care hospitals from 1991 to 1997 and to ascertain what percentage of hospitals experienced varying degree

Methods/Study Appraisal/ Synthesis Methods	Observational Study	Review of published evidence relating to how nurse staffing levels impact on patient, nurse and service outcomes and considers the implications of the body of research for nurse managers in their quest to determine optimum nursing numbers.	The study used SSM to provide a framework for the research process. Soft Systems Methodology and Research Process	Review of literature, Observational Study	A mixed method, longitudinal, descriptive design was used. Registered nurses and licensed practical nurses in two acute-care nursing units completed quantitative and qualitative surveys. Lewin's change theory provided the framework for the study.	Data on uncompensated care, total operating expenses, ownership type, and nurse staffing (productive hours and patient days) come form the Annual Hospital Disclosure Reports form the California Office of Statewide Health Planning and Development.	Statistical Analysis Systems into hospital-level acuity indexes, Observations from each year were marked by that years to create a wide data set in which all 7 years of data for each hospital existed side by side in one single observation for that hospital.

Primary Outcome Measures and Results	Efforts to reform the delivery and financing of health care, including new payment mechanisms designed to increase accountability and efficiency and to bundle services, mean that the costs and outcomes of nursing care will be under increasing scrutiny in the years ahead.	The relevant research literature is insufficiently robust or extensive to demonstrate clear association between nurse staffing levels and the organization of nursing work and various outcomes of interest.	Although little evidence of multi-disciplinary approaches to care, it was evident that the issue which had the biggest impact upon both the organization and delivery of care was staffing levels.	As the 21st. Century presses on, healthcare will become more competitive on cost, quality, speed, and customer service. The most logical starting point to improve cost while enhancing the other three avenues of the business is to take a good look at improving the current nurse staffing model. Bottom-line results are sure to follow as clinical professionals become more flexible and better utilized.	No significant change in job satisfaction was observed; however, it was less than optimal at all three time-periods. Nurses were committed to their jobs but relatively dissatisfied with their input into the goals and processes of the organization. Client care was perceived to be more effective under Total Patient Care.	ratio of uncompensated care to total operating expenses (the uncompensated care ratio) over the study period was similar across the four staffing quartiles at 5% to 6%, as was the mean proportional growth rate of uncompensated care. Findings from this study only partially support the hypothesis that hospitals that needed to increase nurse staffing hours the most in order to reach compliance	Levels of types of nursing staff, Types of nursing staff per actual patient load, Types of nursing staff per patient load adjusted for patient acuity, Skill mix.

Author Conclusions/ Implications of Key Findings	The results of the study can be used to shift the national dialogue form questions about whether nurse staffing levels have a significant effect on patient outcomes to a focus on how current and emerging payment systems can reward hospital's efforts to ensure adequate staffing.	In order to secure the very best quality nursing care there is a need for nurse managers and others to question whether the common approaches to determining nursing skill mix and staffing levels are of real practical use and whether they continue to be appropriate within the context of the drive for 'best evidence' to underpin all aspects of health service organization and delivery.	The issue which had the biggest impact upon both the organization and delivery of care was staffing levels, lack of qualified staff, job stress, staffing load, and the need for effective clinical leadership.	The three authors conclusions are that healthcare staffing is a huge challenge and that the difficulty lies in defining the work content of the clinical professionals and then getting them to believe that their work content can be measured accurately. Once those two steps have been navigated successfully, the model development and implementation becomes attainable.	remained consistent following the transition to Total Patient Care. However, nurses perceived that client care within the modified Total Patient Care model was more effective that in the previous model. Nursing Administration must work collaboratively with nurses to improve processed in nursing practice that could enhance nurses' job satisfaction and improve client care delivery.	findings did not show broad reductions in uncompensated care following the implementation of minimum nurse staffing legislation in California, apparent reductions among county and of-profit hospitals suggest the need for caution when considering minimum nurse staffing legislation and other quality improvement policies that directly increase operating expenses, and therefore threaten hospital profitability.	Given the cost constraints faced by hospitals, mandated ratios coexisting with low reimbursement rates may put hospitals under an extreme financial squeeze. Ultimately, we must reassess the degree to which government and private reimbursement for hospital care can be lowered without adversely affecting inputs such as nurse staffing and outputs such as the quality of care.

Strengths/ Limitations	Paying close attention to patient transfers and other factors that have a major effect on workload should become an active part of daily conversations among nurses, physicians, and hospital leaders in planning for the care of their patients.	The study looks at how nursing outcomes are defined and measured.	Staffing provision was described as inappropriate, inadequate, insufficient, poor staffing levels, shortage of staff and lack of staff.	The transformation of professional healthcare staffing is a challenge for leadership to address. Leadership continually must advocate the need for measurement, provide positive reinforcement of successes and challenges, and make adjustments when necessary.	Evidence related to nursing outcomes following the implementation of Total Patient Care is inadequate and inconclusive.	The authors conclude that minimum nurse staffing ratios may lead some hospitals to limit uncompensated care, likely due to increased financial pressure.	In the absence of voluntary hospital movement to ensure adequate staffing, mandatory staffing ratios may need to be considered at the stat or federal levels.

Funding Source	Grant (R01-HS015508) from the Agency for Healthcare Research and Quality.	UNISON National Nursing Sector Committee.	Funding Source unknown. It appears to come from the hospital conducting the research into the incident that occurred in a large district general hospital in the United Kingdom.	Industrial Engineering Professors at the University of Arkansas.	This study was supported by a seed grant from the Western Regional School of Nursing.	All contributors received support to conduct the research included in the Contribution from the Agency for Healthcare Research and Quality (Grant Number 2 R01 JS010153-08). Kristin Reiter received additional support from the National Center for Research Resources (Grant Number KL2RR025746).	This research was supported by grants for the National Science Foundation and the Agency for Health Care Policy and Research.

Comments	Special Article	No nurse staffing or skill mix model has been conclusively demonstrated to address all the variables which impact on nursing workload, nor have they been shown to be causally related to patient, nurse or organizational outcomes.	Little attention has been paid to the fact that a significant portion of nurses' time continues to be spent in non-direct patient care activities many of which do not utilize their skills and knowledge of nurses.	The research described here centers on a nurse staffing model that has been developed for a regional hospital in the Midwest United States. A major outcome of this study was the development of a model to predict the appropriate staffing for any given hours, shift, day or week.	This study was carried out with the collaboration of nursing management of the regional health facility.	Staffing data on productive hours only indirectly measure compliance with patient to nurse staffing regulations. Staffing regulations apply to nursing units on a 24-hour continuous basis.	The findings reveal a serious nurse staffing problem understated by mean analysis. It is significant that RNs per patient days of care, adjusted for patient severity and outpatient care, decreased by more than 10 percent in nearly 50 percent of hospitals, yet the mean of only 3 percent decrease makes it appear to be much less of a problem.

Systematic Review Evidence Table Format [adapted with permission from Thompson, C. (2011). Sample evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), *Evidence-based practice: An implementation guide for healthcare organizations* (p. 155). Sudbury, MA: Jones and Bartlett.]

Article Title and Journal	Hospital Nurse Staffing and Quality of Care	The Association of Registered Nurses Staffing Levels and Patient Outcomes	Predicting nursing turnover with catastrophe theory	Nurse staffing levels and nursing outcomes: a Bayesian analysis of Finnish-registered nurse survey data.	How Many Nurses per Patient? Measurement of Nurse Staffing Health Services Research.	A Longitudinal Examination of Hospital Registered Nurse Staffing and Quality of Care, Health Services Research.	Temporary nursing staff-cost and quality issues, Journal of Advanced Nursing.
Author/Year	Stanton, M. W. (2011).	Kane, R. L., Shamilyan, T. A., Mueller, C., Duval, S., Wilt, T. J. (2007).	Wagner, C. M. (2010).	Tervo-Heikkinen, T., Kiviniemi, V., Partanen, P., Vehvilainen-Julkunen, K. (2009).	Spetz, J., Donaldson, N., Aydin, C., Brown, D. S. (2008).	Mark, B., Harless, D. W., McCue, M., Xu, Y. (2004).	Hurst, K., Smith, A. (2010).
Database and Keywords	Hospital Nurse Staffing; Quality of Care.	Nurse staff, Hospital, Quality, Length of stay, Mortality, Safety, Failure to rescue.	Castrophe theory, Management, Nursing Models, Nursing Nonlinear Theory, Nursing Turnover, Research Methods, Workforce Issues.	Bayesian Network, Nurse Staffing, Outcomes, Registered Nurse, Survey	Nurse Staffing, Hospital Survey, Measurement	Quality of care, Health Care Cost and Utilization Project (HCUP), Nurse Staffing.	Agency nurses, Nursing Cost, Nursing Staff, Quality of Nursing Care, Sick Absence, Ward Nursing.

Research Design	Analysis of Staffing.	Meta-Analysis	A correlation Survey with a longitudinal cohort prospective study.	Survey of data, Bayesian Network Model of connections between variables.	Hospital-level and Unit level data were compared using summary statistics, t-tests, and correlations.	Longitudinal Study	Non-participant Observation document analysis.
Level of Evidence	Major factors contributing to lower staffing levels, evident by an average vacancy rate of 13 percent.	Lower hospital mortality evidenced by increased RN staffing.	Anticipated turnover evident by organizational commitment.	Higher levels of RN Staffing evident by better patient, nurse and organizational outcomes.	Improved staffing evident by hospital-level aggregated data.	Mortality reduced evident by increased nurse staffing.	Short-term staff improved quality of care evident by fewer employee sick days.

Study Aim/Purpose	Patient safety and quality of care is a major concern due to effects from hospital nurse staffing.	Studies conducted at the patient level reported generally larger effects of nurse staffing on mortality.	This report of a study comparing an innovative nonlinear model and a traditional linear model for accuracy in prediction of nursing turnover.	The aim of the present study was to assess the relationship between patient-to-registered nurse ratios and nursing outcomes: job satisfaction, and stress, nursing care quality, control of wown practice, intent to leave, adequacy of material resources and attitudes towards technical equipment.	To compare alternative measures of nurse staffing and assess the relative strength and limitation of each measure.	To evaluate previous research findings of the relationship between nurse staffing and quality of care by examining the effects of change in registered nurse staffing on change in quality of care.	This report of a comparative study of temporary and permanent staff work activity, cost and quality of care.
Population Studied/Sample Size/Criteria/ Power	Registered Nurses	Registered Nurses	Registered Nurses	Registered Nurses	Registered Nurses	Registered Nurses	Registered Nurses and Agency Registered Nurses.

Methods/Study Appraisal/ Synthesis Methods	The largest of the studies discussed here found significant associations between lower levels of nurse staffing and higher rates of falls.	The systematic review protocol was created according to the recommendations for Meta-Analysis of Observational Studies in Epidemiology.	Data Analysis included analysis of a cusp catastrophe model.	The subjects of this cross-sectional study with RNs working in direct patient care in five university hospitals in Finland.	Data sources were matched for each hospital. When possible, hospital units or types of units were matched within each hospitals.	Empirical Specification and Analytic Approach addressed three important weaknesses in prior studies of staffing and quality of care.	Data was collected between 2004-2009.

Primary Outcome Measures and Results	The findings thus far can have a positive impact if used to educate and inform interested parties on how quality of care is changing and how it is linked to the contributions of nurses.	Two abstractors extracted the independent variables of RN-to-patient ratios, and the dependent variables as adjusted odds ratio of patient outcomes, using the standardized abstraction protocol./ The analysis supports previous contentions that increased nurse staffing in hospitals is associated with improvement in patient care outcomes.	The exceedingly small turnover sample preempted the use of the computerized program Cuspfit; a proven quasi-quantitative methodology demonstrated 80 - 4% predictability in the cusp catastrophe model overall and 53-6% correct predictions of actual terminations, particularly in nurses with < 5 years of nursing experience.	The innovative analysis gave new insight to the very complex theme of nursing practice environment and its meaning to various process and outcome measures.	Productive nursing hours and direct patient care hours were converted to full-time equivalent employment and to nurse-to-patient ratios to compare nurse staffing as measured by different surveys.	Increasing registered nurse staffing had a diminishing marginal effect on reducing mortality ratio, but had not consistent effect on any of the complications. Selected hospitals characteristics, and financial performance had other independent effects on quality measures.	Permanent staff only wards had higher bed occupancies but permanent plus temporary staff units included more dependent patients.

Author Conclusions/ Implications of Key Findings	Policymakers may want to monitor developments in nurse staffing issues closely in order to determine if additional legislative changes are needed to increase nursing supply and reduce adverse patient outcomes.	The available evidence indicates that there is a statistically and clinically significant association between RN staffing and adjusted odds ratio of hospital related mortality.	Catastrophe models are useful in predicting nursing turnover. Future nursing researchers should act on this evidence to benefit forthcoming studies and the profession.	Based on the experience with BNs in the analysis, it seems that it is a promising new method, which can help the researcher visualize and understand the relationships between concepts.	Unit-level data collection may be more precise. Differences between databases may account for differences in research findings.	The findings provide limited support for the prevailing notion that improving registered nurse staffing unconditionally improves quality of care.	Better understanding about the flexible National Health Service workforce should improve workforce planning and developments. Temporary staff effects may vary geographically and seasonally, and research is needed to explore these issues.

Strengths/ Limitations	Although hospital with low nurse staffing level tend to have higher rates of poor outcomes, increasing staffing levels is not easy.	Interpreting cost-effectiveness depends on the perspective of the party involved. Although the value of lives saved and adverse events for gone may justify more nursing staff, the business case for hospitals is harder to make.	Although organizational commitment and anticipated turnover demonstrated high predictability in the cusp catastrophe model, job tension was not a significant predicator of turnover in the nursing population studied.	The study points to the importance of ensuring the existence do adequate material resources, such s different supplies and equipment needed in patient care, This has been connected to nurses' satisfaction and empowerment, a key staff outcome in Magnet hospitals.	Researchers often are limited by data availability, and thus the ideal measures of nurse staffing might not be obtained of every study.	The relationship between hospital nurse staffing and quality of care continues to be a significant concern for health services researchers, healthcare executives, policymakers, and consumers.	This study has limitations that can be overcome by follow-up work. Analyze data seasonally and geographically.

Funding Source	Nurse Staffing and Quality of Care. Grant Nol HS09958. Harvard University.	Unknown	The National Institute of Nursing Research, the National Institutes of Health, and the Department of Health and Human Services for the National Research Service Award, Grant # 5 F31 NR008461-02, a fellowship award that funded this research.	Financial support for this study was provided by the Kuopio University Hospital and the Finnish Work Environment Fund.	The research underlying this paper was supported by the Gordon & Betty Moore Foundation, the California Endowment, and the California Health Care Foundation.	Unknown.	Department of Health and NHS Trust for funding this study.

Comments	This valuable information can be used by decision makers to make more informed choices in terms of adjusting nurse staffing levels and increasing nurse recruitment while optimizing quality of care and improving nurse satisfactions.	Future research should address the role of nurse staffing and competence on the effectiveness of patient care, taking greater cognizatic of other relevant factors such as patient and hospital characteristics and quality of medical care.	Nursing researchers, managers and practitioners should act on this evidence to benefit future studies and the profession.	Future studies can provide more in-depth insights into the nursing work environment and its effects on quality of work life for nurse and outcomes of quality patient care.	Efforts to synthesize studies using these widely varied measures need to be undertaken with caution, noting that findings using one type of measure may not be generalizable across all types of measures.	Improvements in risk-adjustment methodologies, increasing the availability of more complete and reliable data elements about nurse staffing in large secondary databases and identification and development of quality measures hat are more sensitive to variations in nursing care are critical to advance knowledge in the field.	Temporary workers have an impact on staff activity and patient care. Little is known about the impact of temporary nursing staff on ward activity, cost and quality, although patient in wards employing temporary staff are said to be at risk.

Systematic Review Evidence Table Format [adapted with permission from Thompson, C. (2011). Sample evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), *Evidence-based practice: An implementation guide for healthcare organizations* (p. 155). Sudbury, MA: Jones and Bartlett.]

Article Title and Journal	Documentation of in-hospital falls on incident reports: Qualitative Investigation of an imperfect process. Biomedical Central Health Services Research.	Inconsistency in Classification and Reporting of In-Hospital Falls. Journal of The American Geriatrics Society.	Improving Nurse-To-Patient Staffing Ratios as a Cost-Effective Safety Intervention. Journal of Medical Care	Solving nursing Shortages; A common priority. Journal of Clinical Nursing.	Association Between Nursing Workload and Mortality of Intensive Care Unit Patient.	Patient Falls: Association with Hospital Magnet Status and Nursing Unit Staffing. Research in Nursing & Health.	Systematic review of Nursing Workload and Staffing on establishing healthy work environments. International Journal Evidence Based Health Compilation.
Author/Year	Haines, T. P., Cornwell, P., Fleming, J., Varghese, Pl, Gray, L. (2008).	Haines, T. P., Massey, B., Hons, B. P., Varghese,P., Fleming, J., Gra, L. (2009).	Rothbert, M. B., Abraham, I., Lindenauer, P. K., Rose, D. N. (2005).	Buchan, J., Aiken, L. (2008).	Kiekkas, P., Sakellaropoulos, G. C., Brokalaki, H., Manolis, E., Samios, A., Skartsani, C., Baltopoulos, G. I. (2008).	Lake, E. T., Shang, J., Klaus, S., Dunton, N. E. (2010).	Pearson, A., O'Brian, L., Thomson, D., Doucheh, E., Tucker, D., Wiechula, R., Long, L., Porritt, K., Jordon, Z. (2006).

Database and Keywords	Incident Reports; Falls; hospital staffing	Accidental Falls; hospitals; measurements	Nursing, cost-effectiveness, hospital economics, hospital staffing, quality of care.	Nurses, Nursing, Workforce Issues, Workforce planning.	Nursing Intensive Care Unit, Mortality Nursing Workload, Patient Acuity, Nurse Staffing.	Patient Safety, Staffing, Hospitals, Magnet Hospitals, Patient Falls.	Nursing Staffing, Nursing Workloads, Organizational outcome, Patient outcome, systematic review, work environment.
Research Design	Qualitative multi-centre investigation using an open written response questionnaire.	Two interrater agreements trial with pre-post intervention design.	This was a cost-effectiveness analysis from the institutional perspective comparing patient-to- nurse ratios ranging from 8:1-4:1.	Overview and Review of Literature	Observational prospective study. Patients consecutively admitted in the medical-surgical ICU of a Greek Hospital over a 1 years period were enrolled.	Retrospective cross-sectional observational study using 2004 NDNQI data.	Meta-Analysis, randomized control trials, quasi-randomized.
Level of Evidence	Completing incident reports improves patient safety.	Inconsistency in reporting of falls, which could explain some of the variation in results not evident within this field.	Decreasing staffing has been linked to costly complications, and these presumably account for the increased length of stay.	Growing evidence of the impact of relatively low staffing levels on health care delivery and outcomes.	Evidence shows that there are associations between nurse understaffing and ICU patient mortality when acuity is not considered.	The study strengthens the evidence base on how nurse staffing patterns and practice environments support patient safety.	Patient outcomes included promotion of physical and mental health as evidenced by observable positive health and well being.

Study Aim/Purpose	Incident reporting is the prevailing approach to gathering data on accidental falls in hospitals for both research and quality assurance purposes, though is of questionable quality as staff time pressures, perception of blame and other factors are thought to contribute to under reporting.	To investigate agreement between hospital staff on what constitutes a fall and hold be recorded on an incident report, to identify factors that influence whether a scenario is classified as a fall, and to examine the effect of providing a definition of a fall on interrater agreement.	Responding to research confirming the link between nurse staffing and patient outcomes, 14 states have introduced legislation to limit patient-to-nurse ratios. However, increased staffing places a considerable financial burden on hospitals	This paper provides a context for this special edition. It highlights the scale of the challenges of nursing shortages, but also makes the point that there is a policy agenda that provides workable solutions.	The aim of this study was to investigate difference s in patient mortality during ICU stay according to patient exposure to nursing workload. Estimation of this exposure was base on the ratio between patient care demands at the unit level and nurse staffing level.	The purpose of this study was to examine the relationship among nurse staffing, RN composition, hospital's magnet status, and patient falls.	The purpose of the review sets out to examine the impact if any of nursing workload and staffing on creating and maintaining healthy work environments.

Population Studied/Sample Size/Criteria/ Power	Hospital Wards	Four hundred forty-six hospital staff (nursing 76%, physiotherapy 14%, Occupational Therapy, 6%) working on participating wards over a 24 hour period.	The study included general medical and surgical patients	Registered Nurses	Registered Nurses	Registered Nurses, License Vocational Nurses, Nurses Aids	The review considered all participants involved or affected by workload and staffing concepts within the nursing workforce in a healthcare environment.

Methods/Study Appraisal/ Synthesis Methods	A multidisciplinary research team based at one of the participation sites commenced a quantitative and qualitative multi-centre investigation into in-hospital falls reporting using an open written response questionnaire.	Two pre-post-interventions (within subjects) trials were conducted. The pre-phase in each trial tested staff agreement without provision of a definition of a fall. The post phase in Trial 1 tested staff agreement after provision of the World Health organization definition of a fall. A comparison of pre to post staff agreement across the two trials was then conducted to address the fourth aim.	Base Case Analysis, and Sensitivity Analysis was calculated using the cost-effectiveness in dollars per lived saved of various Patient-To-Nurse ratios using national cost estimates combined with patient mortality data from one large study and length of stay data from another.	Review of Policies regarding policy agenda addressing nursing shortage, overview of nurse: population ratios in different countries and regions of the world.	The Therapeutic Interventions Scoring System (TISS)=28 was used for measuring patient care demands. Logistic regression was used for evaluating the association between mortality during ICU length of stay and median or peak patient exposure to nursing workload, after adjusting for patient clinical severity.	NDNQI Data pertain to selected nursing units in participating hospitals. In conjunction with NDNQI staff, participating hospital identify units by type of patient population & primary service. Sample contained 5,388 Nursing Units in 636 hospitals.	Criteria for considering studies for this review included, types of studies, interventions, outcome measures, categories, experimental, studies, descriptive studies, descriptive correlation studies.

Primary Outcome Measures and Results	There is a degree of inter-relationship between all the cultural/environmental factors with the determinants of reporting, though more specific links are demonstrated in conceptual diagram.	Hospital and ward type influence whether a scenario was classified as a fall. Overall agreement in classifying scenarios as a fall was only marginally greater after provision of the definition in both phases, although neither had an effect on whether staff would complete an incident report.	The model was most sensitive to the effects of patient-to-nurse ratios on mortality.	Nursing shortage are highlighted; Inadequate workforce planning, allocation mechanisms, resource constrained under supply of new staff, poor recruitment, retention, and return policies and ineffective use of available nursing resources through inappropriate skill mix, and utilization, poor incentive structures and inadequate career support.	Three hundred ninety six (396) patients were included and died. Differences in ICU mortality between high and low groups of median and peak patient exposure to nursing workload, although not statistically significant, were clinically remarkable both when all patients were studied and when medical and surgical patients were separately studied.	Measures of RN composition included nurse educational level, national specialty certification, and proportion of hours supplied by agency employee nurses. NDNQI Magnet Hospitals staff higher levels than NDNQI non-magnet hospitals.	The search strategy used, resulted in a total of 2162 papers. Al papers were selected for full paper retrieval and were assessed independently by two reviews for methodological quality.

Author Conclusions/ Implications of Key Findings	In-hospital fails continue to be a common and concerning adverse event amongst hospital inpatients.	Disagreement between hospital staff in what constitutes a fall may contribute to inconsistent research findings in this field and it not meaningfully improved through provision of a definition.	As a patient safety intervention, patient-to-nurse ratios of 4:1 are reasonably cost effective and in the range of other commonly accepted interventions.	The main challenge for policy makers is to develop a co-ordinate package of policies that provide a long term and sustainable solution.	Consideration of individual differences in patient acuity might add sensitivity to the detection of associations between nurses understaffing and ICU mortality.	The study findings have implications for management research policy. At the highest management level, hospital executives can improve patient safety by creating environments consistent with magnet hospital standards.	Given that the evidence of a relationship between increased patient nurse ratios and perceived workload is equivocal, further study be pursued.

Strengths/ Limitations	The written response format used in the research did not allow investigators to return to respondent stop clarify their responses and to further probe to explore deeper issues relating to those stated. The present study also had a high rate of surveys returned where responses to the questions being investigated in the present project were not provided.	The research was unable to evaluate actual hospital staff falls incident reporting practices; it measure only what staff said they would report.	The study has several limitations. Mortality data is drawn form a single, large study of Pennsylvania Hospitals. Although many authors have found similar impact of nursing on mortality, some have not.	This paper proved a broader perspective highlighting the scale of the challenge of nursing shortages but also making the point that there are many common challenges and a policy agenda that points to workable solutions.	Inability to detect associations between nurse staffing and mortality in the ICU might be attributed to many methodological disadvantages such as retrospect collection of data presence of confounding factors which are difficult to control, difficulties in capturing dynamic nurse staffing conditions and the effect of medical staffing contributions.	The study is limited by a cross-sectional design, the limited data to adjust for patient characteristics, and the age of the data. Another limitation is the convenience sample, the study strengthens the evidence based on how nurse staffing patterns and practice environments support patient safety.	The review sought to determine the impact of patient nurse system characteristics and system processes on workload, scheduling and concepts of productivity and utilization.

Funding Source	The authors salaries were funded by their host institution. No funding body had involvement in manuscript preparation or the decision to submit the manuscript for publication.	This project received no sponsorship form any funding source.	Unknown	Grant-in-aid for Scientific Research, and from the Japan Society of Promotion of Science Grant for International Collaborative Research.	Unknown	Unknown	Unknown
Comments	Understanding the framework and the factors motivating its structure has allowed for the development of several recommendations-aimed at improving completeness and consistency in recording of falls on incident reports.	This research was unable to evaluate actual hospital staff falls incident reporting practices; it measured only what staff said they world report.	Physicians, hospital administrators and the public must now begin to see safe nurse staffing levels in the same light as other patient safety measures.	This article indicates improved evidence based on critical issues such as nursing shortages.	The author strongly recommend duplicating this study through enrollment of larger samples, which are necessary for detecting statistically significant differences between exposure to nursing workload and mortality.	Fewer falls can yield cost savings and prevent patients pain & suffering. Nursing Unit Managers can use the nursing hours and falls stats for their nursing units type as a reference value to support decisions.	An increase in the number of RNs nurse hours available associated with improved patient outcome in relation to falls, pneumonia, pressure ulcers, UTI's, LOS, and Post Op Infections.

Systematic Review Evidence Table Format [adapted with permission from Thompson, C. (2011). Sample evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), *Evidence-based practice: An implementation guide for healthcare organizations* (p. 155). Sudbury, MA: Jones and Bartlett.]

Article Title and Journal	Nurse Staffing Levels and Teamwork: A Cross-Sectional Study of Patient Care Units in Acute Care Hospitals. Journal of Nursing Scholarship.	Relationship between quality of care, staffing levels, skill mix and nurse autonomy: literature review. Journal of Advanced Nursing.	Nurse Staffing and Healthcare Outcomes A systematic Review of the International Research Evidence. Advances in Nursing Science.	Translating Evidence-Based Falls Prevention into Clinical Practice in Nursing Facilities: Results and Lessons form a Quality Improvement Collaborative. Journal of The American Geriatrics Society.	Capacity management of nursing staff as a vehicle for organizational improvement. BMC Health Services Research.	Nurse staffing levels and hospital mortality in critical care settings: literature review and meta-analysis. The Authors. Journal Compilation.	Staffing, skill mix and the model of care. Journal of Clinical Nursing.
Author/Year	Kalisch, B. J., Lee, K. H. (2011).	Currie, V., Harver, G., West, E., McKenna, H., Keeney, S. (2005).	Lanksbear, A. J., Sheldon, T. A., Maynard, A. (2005).	Colon-Emeric, C., Schenck, A., Gorospe, J., McArdle, J., Dobson, L., DePorter, C., McConnell, E. (2006).	Elkhuizen, S. G., Bor, G., Smeenk, M., Klazinga, N. S., Bakker, P. (2007).	Numata, Y., Van der Wal, R., Globerman, J., Semeniuk, P., Balke, E., FitzGerald, J. M. (2006).	Dutfield, C., Roche, M., Diers, D., Catling-Paull, C., Blay, N. (2010).

Database and Keywords	Teamwork, Staffing, Nursing	Autonomy, Literature Review, Nursing Perceptions, Quality of Care, Shared Governance, Skill mix, Staffing.	Failure to rescue, mortality, outcomes, quality nursing care, research methods, skill mix, staffing, systematic review, workforce.	Falls; Nursing Facilities; Quality Improvement.	Nursing Staff; Capacity Management; Organizational Improvements.	critical care, hospital mortality, intensive care, meta-analysis, nurse: patient ratios, nursing, systematic literature review.	Models of care, nursing care delivery systems, nursing workload, practice environment, skill mix, staffing levels.

Research Design	A cross-sectional, descriptive design with a sample of nursing staff (N-2,545) on 52 patient care units in four hospitals was utilized.	A diverse collection of literature related to the field of healthcare quality.	Longitudinal, and Cross-sectional studies.	Natural experiment with nonparticipating facilities serving as controls.	A capacity model was developed to calculate required nursing staff capacity. The model used historical bed utilization, nurse-patient ratios, and parameters concerning contract hours to calculate beds and nursing staff needed per shift and the number of nurses needed on an annual basis in a ward.	Literature for this review was identified by a combination of electronic searches of core bibliographic databases, retrieval of references cited in available reviews, and hand searches from in-house reference collections.	Secondary analysis of data collected on 80 randomly selected medical-surgical wards in 19 public hospitals in New South Wales, Australia during 2001-2005.

Level of Evidence	The ability to provide quality and safe care is associated with teamwork, which in turn requires adequate staffing.	Evidence shows that patient satisfaction as an indicator of quality is compromised on a number of fronts. There is conflicting information on how nurses and patient think about quality.		Evidence has shown that fails remain a major source of morbidity for nursing facility residents. A substantial body of research has focused on fall reduction in this setting.	This paper presents a comprehensive capacity model that give insight into required nursing staff capacity and opportunities to improve capacity utilization on a ward level.	There is evidence that there is an association between nurse-staffing levels and patient mortality during and after critical care.	Evidence indicates that there is a correlation of patient, nurse, skill mix and ward environment within the model of care.
Study Aim/Purpose	The aim of this study was to examine the relationship of staffing levels to nursing teamwork.	This paper reports literature review exploring the relationship between quality of care and selected organizational variables through consideration of what is meant by quality.	The aim was to retrieve research on nurse staffing and healthcare outcomes published since 1990, to review the relationship between quality of care and the cost of the nursing workforce that is a concern to policymakers.	To describe the changes in process of care before and after an evidence-based fall reduction quality improvement collaborative in nursing facilities.	To review weather or not a comprehensive model could be developed that covers both capacity planning for nursing staff and improving capacity utilization in hospital wards.	This paper reports a review of the literature on the association between critical care nurse staffing levels and patient mortality.	The study aimed to explore whether nurse staffing, experience and skill mix influenced the model of nursing care in medical-surgical wards.

Population Studied/Sample Size/Criteria/ Power	This study utilized a cross-sectional, descriptive design, and a purposive sample was used. The setting for this study was four hospitals located in the Midwestern United States.	Nurse staffing, skill mix.	Registered Nurses, License Vocational Nurses, Staffing Mix.	Thirty-six participating and 353 non participating nursing facilities in North Carolina.	Nursing staff,	Registered Nurses; Nurse Staffing	Registered Nurses; Skill Mix, Nurse Staffing.
Methods/Study Appraisal/ Synthesis Methods	The Nursing Teamwork Survey was utilized to collect data on the level of perceived nursing teamwork on each of the study units. In addition, nursing staffing data were collected for each study unit.	A search was conducted using CINAHL, Medline and Embase databases. The objective was to draw together a diverse collection of literature related to the field of healthcare quality.	Systematic Review of the literature and policy analysis and conducted interviews with key researchers in the field in both the United States and the United Kingdom.	Compliance was measured using facility self-report and chart abstraction before and after the intervention. Fall rates as measured using the minimum data et were compared with those of nonparticipating facilities as an exploratory outcome.	A capacity model was developed to calculate required nursing staff capacity.	Major electronic databases were searched, including MEDLINE, EMBASE, and the Cumulative Index of Nursing and Allied Health Literature.	Nurses were surveyed using The Nursing Care Deliver System and the Nursing Work Index-Revised. Staffing and skill mix was obtained from the ward roster and other data from the patient record. Models of care were examined in relation to these practice environments.

Primary Outcome Measures and Results	Higher levels of nurse staffing were related to better teamwork. Specifically, the greater the hours per patient day, the higher the level of overall teamwork on the unit.	Quality of care is a complex multi-dimensional concept which presents researchers with a challenge when attempting to evaluate it.	The systematic review of research on the relationship between nursing staffing and patient outcomes in general acute settings identified 61 studies, 38 of which dealt with acute general hospitals and were published since 1990.	Self-reported compliance with screening, labeling, and risk factor reduction approached 100%. No significant changes in proportions of falls or fall rates were observed according to chart abstraction.	A comprehensive capacity model was developed and successfully applied to support capacity decisions on operational, tactical, and strategic levels.	Nine studies were selected for 251 references screened. All nine were observational. The individually reported associations between high nurse staffing and low hospital mortality became non-significant in all but one study.	Skill mix, nurse experience, nursing workload and factors in the ward environment significantly influenced the model of care in use.
Author Conclusions/ Implications of Key Findings	Adequate levels of staffing are needed to ensure nursing teamwork.	Research looking at the relationship between the selected organizational variables and perceptions of quality also suffer from a number of limitations.	The findings of this review are particularly relevant to countries such as England that have low levels of RN staffing relative to the ratios reported here (around 1:10; 2.4 CHPPD in 1999).	Multiple-risk-factor reduction tasks are infrequently implemented, whereas screening tasks appear more easily modifiable in a real-world setting.	The capacity model appeared to be a useful tool for supporting discussions between ward and hospital management by giving objective and quantitative insight into staff and bed requirements.	The impact of nurse staffing levels on patients' hospital mortality in critical care settings was not evident in the reviewed studies.	Models of care are not prescriptive but are varied according to ward circumstances and staffing levels based on complex clinical decision making skills.

Strengths/ Limitations	This study is limited by the sample, which was in four hospitals.	Limitations have been identified in the magnet research, including biased sampling techniques both in identifying the hospitals and staff and in the use of group interviews which may have inhibited openness.	Research was limited when looking for randomized trials or quasi-experimental methods.	The study illustrates the many challenges encountered in design, implementation, and measurement of quality improvement initiatives. Interventions to improve interdisciplinary collaboration need to be developed.	The model was applied to initiate organizational improvements, which resulted in more efficient capacity utilization.	The lack of association also indicates that hospital mortality may not be sensitive enough to detect the consequences of low nurse staffing levels in critical care settings.	Variability in the models of care reported by ward nurses indicates that nurse adapt the model of nursing care on a daily basis, according to patients' needs, skill mix and individual ward environments.

Funding Source	This project was funded by the Blue Cross and Blue Shield Foundation and the Michigan Center for Health Intervention University of Michigan School of Nursing, National Institutes of Health, and National Institute of Nursing Research.	Unknown	Department of Health Sciences, University of York, York, England, and support from the authors who contributed to searching for, and analysis of the papers in the review.	Funded by a contract form the North Carolina Department of Health and Human Resources, Division of Facility Services, Licensure and Certification.	Unknown	Unknown	This research is supported by funds from NSW Health.

Comments	Kalisch and colleagues compared selected outcomes before and after and intervention to improve teamwork and found a significant decrease in patient falls, turnover, and vacancy rates after the intervention.	This literature review has shown that a great deal of interesting and important research has been undertaken on the quality of care, but there is also a real gap in our knowledge and understanding about how patients define and experience quality of care.	Overall, there is accumulating evidence of a relationship between nurse staffing, especially higher skill mix, and patient outcomes.	Interventions to improve interdisciplinary collaboration need to be developed.	A comprehensive model could be developed that covers both capacity planning for nursing staff and improving capacity utilization in hospital wards.	The appraisal identified methodological challenges in the type of studies reviews: problems in measurement of nurse staffing levels, unmeasured, imprecisely measured, and/or uncontrolled confounding factors, and potential lack of sensitivity of the selected outcome measure (mortality).	As nursing shortages are likely to continue and staffing continues to shift to the use of fewer registered nurses, it is timely to consider how best to allocate staff to patients. What is needed is a method of matching patient needs to staff abilities on the basis of data and evidence.

Systematic Review Evidence Table Format [adapted with permission from Thompson, C. (2011). Sample evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), *Evidence-based practice: An implementation guide for healthcare organizations* (p. 155). Sudbury, MA: Jones and Bartlett.]

Article Title and Journal	Determining nurse staffing needs: the workload intensity measurement system.	Hospital nurse staffing models and patient and staff-related outcomes.	Nurse Reports From the Frontlines: Analysis of a Statewide Nurse Survey. Nursing Forum	Nurse Specialty Certification, Inpatient Mortality and Failure to Rescue. Journal Of Nursing Scholarship.	Implications of the California Nurse Staffing Mandate for Other States. Health Research and Educational Trust.	Creating and Analyzing a Statewide Nursing Quality Measurement Database. Journal of Nursing Scholarship.	
Author/Year	Yin Hoi, S., Ismail, N., Ong, L. C., Kang, J. (2010).	Butler, M., Collins, R., Drennan, J., Halligan, P., O'Mathuna, D. P., Schultz, T. J., Sheridn, A., Vilis, E. (2011).	Neff, D. F., Cimiotti, J. P., Heusinger, A. S., Aikern, L. H. (2011).	Kendall-Gallagher, D., Sloane, D. M., Cimiotti, J. P. (2011)	Aiken, L. H., Sloane, D. M., Cimiotti, J. P., Clake, S. P., Flynn, J., Seago, J. A., Spetz, J., Smith, H. L. (2010).	Aydin, C. E., Bolton, L. B., Donaldson, N., Brown, D. S., Buffum, M., Elashoff, J. D., Sandhu, M. (2004).	
Database and Keywords	nursing workload, patient classification system	Hospital nurse staffing models, staff related outcomes.	nurse work environment, nurse education, job satisfaction, burnout, intent to leave.	Certification, nursing, nursing education, experience, outcomes, outcome assessment.	Nurse staffing, California nurse ratios.	Quality Indicators, Nursing Workload, Data Collection Methods, Data Analysis.	

Research Design	The study was a descriptive observation survey adopting a work sampling technique.	Randomized control trials, controlled clinical trials, controlled before and after studies and interrupted time series analyses of interventions relating to hospital nurse staffing models.	Using the National Sample Survey of Registered Nurses data, nurses from this state were compared with the national sample of nurses on demographics and work setting.	Secondary analysis of risk-adjusted adult general, orthopedic, and vascular surgical impatient discharged during 2005-2006 from 652 nonfederal hospitals controlling for state, hospital, patient, and nursing characteristics by linking outcomes, administrative, and nurse survey data.	Nurse workloads are compared across the three states and we examine how nurse and patient outcomes, including patient mortality and failure-to-rescue, are affected by the differences in nurse workloads across the hospitals in these states.	Prospective nurse staffing, process of care, and patient outcomes data based on the convenience sample at acute care hospital in California with rolling-site accrual.	

Level of Evidence	Nurse staffing, have been linked to patient complications and deaths in hospitals and as a factor affecting the quality of care.	Nurse staffing models improve patient outcomes based on nursing workforce.	Evidence shows that nurse staffing problems are perennial and universal based on history.	There is ample evidence of an association between patient-to-nurse workloads and hospital mortality.	Evidence of favorable effects of better nurse staffing can be found not only in the comparison of nurse reports from better and poorer staffed hospitals but also in differences between these hospitals in the severity-adjusted likelihood that the patients being treated in theses hospital will be discharged alive.	Evidence based decision support with and between hospitals and health systems has resulted from the CalNOC project.	

Study Aim/Purpose	The aim of the present study was to examine the validity of the ratios used and to develop a prototype workload measurement system (WIMS) using the nursing diagnosis as critical indicators of patient acuity.	The aim of the study was to explore the effect of hospital nurse staffing models on patient and staff-related outcomes.	Registered Nurses on the frontlines of care are increasingly burdened by changes in staffing, increased turnover, demands on their time and the continual need for advanced knowledge and training.	To determine if hospital proportion of staff nurses with specialty certification is associated with risk-adjusted inpatient 30-day mortality and failure to rescue.	To determine whether nurse staffing in California hospitals, where state-mandated minimum nurse-to-patient ratios are in effect, differs from two states without legislation and whether those differences are associated with nurse and patient outcomes.	To implicate a replicable methodology for designing and analyzing a large ongoing reliable and valid quality database to examine nurse staffing and patient care outcomes in acute care hospitals.	
Population Studied/Sample Size/Criteria/ Power	Registered Nurses	Registered Nurses	Registered Nurses.	Registered Nurses.	Primary survey data from 22,336 hospital staff nurses in California, Pennsylvania, and New Jersey in 2006 and stat hospital discharge databases.	Registered Nurses.	

Methods/Study Appraisal/ Synthesis Methods	The study was conducted in a 1500-bed acute care hospital in Singapore. A questionnaire was designed to identify critical indicators for workload measurements.	Databases were searched such as Cochrane/EPOC resources, PubMed, EMBASE, CINAHL Plus, CAB Health, Virginia Henderson International Nursing Library, the Joanna Briggs Institute database, the British Library, International theses databases, an well as generic search engines.	Surveys were mailed to a random sample of all registered nurses licensed and residing in large southeastern US State. Responses from 10, 951 nurses providing direct patient care were compared to national findings. Descriptive statistics were used to examine demographics, the practice environment, nurse outcomes and the quality of care.	Nurse data, categorized by education and certification status, were aggregated to the hospital level. Logistic regression models were used to estimate effects of specialty certification and other nursing characteristics on mortality and failure to rescue.	Nurse workloads were derived by asking each hospital RN how many patient they were assigned on their last shift. The workloads are compared across the three states and examined on how nurse and patient outcomes, including patient mortality and failure-to-rescue.	The ongoing CalNOC database development and repository project, the largest statewide effort of its kind in the United States, currently includes data on hospital nurse staffing, patient days, patient falls, pressure ulcer and restraint prevalence, registered nurse education and patients' perceptions of satisfaction with care.	

Primary Outcome Measures and Results	Nursing time required for a low-acuity ward increased from 90.5 to 177.1 hours per day.	6,202 studies were relevant to the review. No eligible studies of educational interventions, grade mix interventions, or staffing levels and therefore we are unable to draw conclusions in relation to these interventions.	Nurses in this state are more racially diverse and less educated when compared to nurses nationally. These nurses report high levels of burnout and job dissatisfaction, and almost one-quarter intend to leave their jobs within the next year.	Hospital proportion of baccalaureate and certified baccalaureate staff nurses were associated with mortality and failure to rescue; no effect of specialization was seen in the absence of baccalaureate education.	California hospital nurses cared for one less patient on average than nurses in the other states and two fewer patient on medical and surgical units. Lower ratios are associated with significantly lower mortality. When nurses' workloads were in line with California-mandated ratios in all three states, nurses' burnout and job dissatisfaction were lower, and nurses reported consistently better quality of care.	As of May 2003, the CalNOC database contained staffing data from 842 units in 134 acute care hospitals over 20 quarters from April 1998 to March 2003. The repository also included clinical outcome information on 34,262 reported falls, pressure ulcer prevalence data on 41,982 patients.	

Author Conclusions/ Implications of Key Findings	In such a rapidly changing work environment, workload measurement systems should be reviewed periodically. The workload intensity measurement systems (WIMS) was developed as a potential methodology for measuring staffing needs.	The findings suggest interventions relating to hospital nurse staffing models may improve some patient outcomes, particularly the addition of specialist nursing and specialist support roles to the nursing workforce.	Hospital administrators and those involved in policy decisions must address these issues if we are to retain our nurse workforce and improve the quality of patient care.	Nurse specialty certification is associated with better patient outcomes; effect on mortality and failure to rescue in general surgery patients is contingent upon baccalaureate education.	Hospital nurse staffing ratios mandated in California are associated with lower mortality and nurse outcomes predictive of better nurse retention in California and in other states where they occur.	This working model for collecting reliable and valid data was derived form multiple hospitals across California. The data are the basis for studies to contribute to the development of evidence-based public policy, and for ongoing study of the effects of nurse staffing on clinical and service outcomes.	

Strengths/ Limitations	Strengths to the study were that critical indicators that were not represented by the nursing taxonomies, wire included in the study by the researchers for analysis which included admission and discharge rates.	The evidence in relation to the impact of replacing Registered Nurses with unqualified nursing assistants on patient outcomes is very limited. However, it is suggested that specialist support staff, such as dietary assistants, may have an important impact on patient outcomes.	Limits to the study were that many of the registered nurses were slightly more racially diverse, and twice as many of these nurses are foreign educated.	Several limitations regarding the analysis should be noted. As a cross-sectional study, causation cannot be established; however, significant patterns of relationships between explanatory variables and outcomes can be explored.	Strengths from the study show favorable evidence of the effects of better nurse staffing.	The potential for systematic error is also considered and examined. One example is "fall injury level." There were variations in incident reporting, with some hospitals coding most falls as having at least a mild injury, even if not intervention was required.	

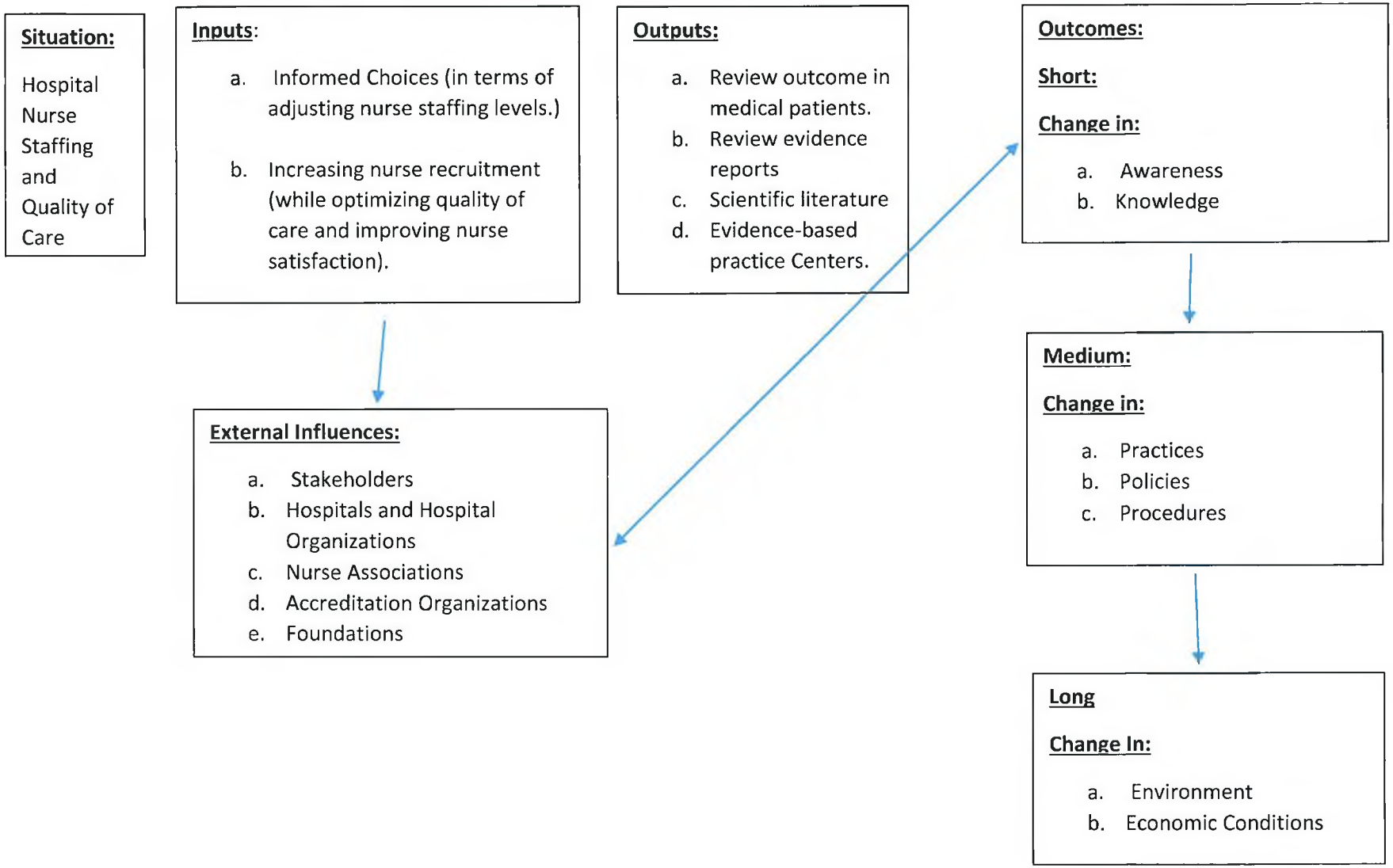
Funding Source	MOH Nursing Research Committee for funding the study in 2004.	Sources of support; UCD School of Nursing, Midwifery and Health systems, Ireland, Dublin City University, Ireland, Joanna Briggs Institute, Australia, University of Ottawa, Canada, and Health Research Board, Ireland.	It is supported by a generous gift form Blue Cross And Blue Shield of Florida, Inc.	The research was supported by the National Institute of Nursing Research.	This research was supported by the National Institute of Nursing Research, National Institutes of Health, the Robert Wood Johnson Foundation, and AMN Healthcare Inc.	Unknown	

Comments	Moving forward, further research would be required to apply and validate the WIMS as an alternative approach for determining staffing needs.	Nurse staffing interventions have been introduced across countries in recent years in response to changing patient requirements, developments in patient care, and shortages of qualified nursing staff.	Registered nurses in this large southeastern state report inadequate resources and the administrative support that are necessary to provide quality care.	Findings from this study suggest that specialty certification for nurses with BSN and higher education may be a promising investment for improving patient outcomes.	From a policy perspective the findings were revealing. There are multiple strategies to improve hospital nurse staffing; state-mandated nurse staffing ratio is one. Improved nurse staffing, however it is achieved, is associated with better outcomes for nurses and patients.	The data of this study is a basis to contribute to the development of evidence-based public policy, and for ongoing study of the effects of nurse staffing on clinical and service outcomes.	

Appendix B

Logic Model

Logic Model Diagram



Appendix C

Nursing Questionnaire

True/False Questions Instructions:

This "activity contains 10 questions" in which you will mark either True or False for each question in the space provided. The test should take no more that 5-7 minutes to complete.

1. Nurse staffing is an important factor in protecting patient safety and maintaining positive patient outcomes.
   - True
   - False

2. Inadequate levels of nurse staffing and/or inappropriate skill mix of nurse providers have been long standing and complex problems with a cyclically-recurring pattern over a period of many years at this facility.
   - True
   - False

3. Research has shown that higher level of staffing and higher ratios of RNs to total nursing personnel are significantly related to better outcomes of care.
   - True
   - False

4. Current staffing does not allow time for unexpected events which occur regularly.
   - True
   - False

5. Changes in skill mix and /or layoffs of hospital personnel have had a negative effect on patient care.
   - True
   - False

6. The basic principles of staffing in the acute care setting should be based on the patient's care needs, the severity of condition, services needed, and the complexity surrounding those services.
   - True
   - False

7. Quality of patient care is jeopardized because of staffing changes implemented in response to managed care.
   - True
   - False

8. To ensure the adequate protection of patients in the acute care settings, it is essential that qualified registered nurses and other licensed nurses be accessible and available to meet the needs of patients.
   - True
   - False

9. Safe RN-to-patient ratios are shown to reduce a number of patient complications.
   - True
   - False

10. Poor RN-to-patient ratios increase nurse turnover, cost money and lower profitability for the facility?
    - True
    - False

Appendix D

Nursing Questionnaire

Percentage Totals

APPENDIX D-1: NURSE STAFFING QUESTIONNAIRE			
This "activity contains 10 questions" in which you will mark either True or False for each question in the space provided. The test should take no more than 5-7 minutes to complete.			
Out of the "20" Surveys conducted the total number of True and False answers are as follows;	**TRUE**	**FALSE**	**TOTAL**
Nurse staffing is an important factor in protecting patient safety and maintain positive patient outcomes.	20	0	20
Inadequate levels of nurse staffing and /or inappropriate skill mix of nurse providers have been long standing and complex problems with a cyclically-recurring pattern over a period of many years at this facility.	15	5	20
Research has shown that higher levels of staffing and higher ratios of RNs to total nursing personnel are significantly related to better outcomes of care.	20	0	20
Current staffing does not allow time for unexpected events which occur regularly.	18	2	20
Changes in skill mix and/or layoffs of hospital personnel have had a negative effect on patient care.	16	4	20
The basic principles of staffing in the acute care setting should be based on the patient's care needs, the severity of conditions, services needed, and the complexity surrounding those services.	20	0	20
Quality of patient care is jeopardized because of staffing changes implemented in response to managed care.	17	3	20
To ensure the adequate protection of patient in the acute care settings, it is essential that qualified registered nurses and other licensed nurses be accessible and available to meet the needs of patients.	20	0	20
Safe RN-to-patient ratios are shown to reduce a number of patient complications.	20	0	20
Poor RN-to-patient ratios increase nurse turnover, cost money and lower profitability for the facility?	20	0	20
Total:	186	14	200
Percentage	93%	7%	100%

Appendix E

Staffing Matrix

Appendix E: Med /Surg Staffing Matrix

# Pts	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
7A-P																					
DIR	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
MGR	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Chg RN										1	1	1	1	1	1	1	1	1	1	1	1
RN/LVN	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	4	4
PCT									0.67	0.67	0.67	1	1	1	1.5	1.5	1.5	2	2	2	2
MT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
US																0.67	0.67	0.67	0.67	0.67	1
Total FTE	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	4.01	5.01	5.01	5.34	5.34	6.34	6.84	7.51	8.51	9.01	9.01	10.01	10.34
Total Hour	40.1	40.1	40.1	40.1	40.1	40.1	40.1	40.1	48.1	60.1	60.1	64.1	64.1	76.1	82.1	90.1	102.1	108.1	108.1	120.1	124.1
mh/st	40.08	20.04	13.36	10.02	8.016	6.68	5.7	5.01	5.347	6.012	5.5	5.3	4.9	5.4	5.472	5.6	6.0	6.01	5.7	6.0	6.0
# Pts	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
7P-A																					
Chg RN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RN/LVN	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3
PCT											0.67	0.67	0.67	0.67	0.67	1	1.5	1.5	1.5	1.5	1.5
MT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
US																					0.4
Total FTE	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.7	3.7	4.7	4.7	4.7	5.0	5.5	5.5	6.5	6.5	6.9
Total Hour	36	36	36	36	36	36	36	36	36	36	44.04	44.04	56.04	56.04	56.04	60	66	66	78	78	82.8
mh/st	36	18	12	9	7.2	6	5.1	4.5	4	3.6	4.0	3.67	4.3	4.0	3.735	3.75	3.9	3.7	4.1	3.9	3.9
Total Hour	76.1	76.1	76.1	76.1	76.1	76.1	76.1	76.1	84.1	96.1	104.2	108.1	120.1	132.1	138.1	150.1	168.1	174.1	186.1	198.1	206.9
Total mh/s	76.08	38.04	25.36	19.02	15.22	12.68	10.9	9.5	9.3	9.612	9.47	9.0	9.2	9.4	9.2	9.4	9.9	9.673	9.8	9.9	9.9
# Pts	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
7A-P																					
DIR	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
MGR	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Chg RN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2
RN/LVN	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9
A/D RN									0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
PCT	2	2	2	2	2.5	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4
MT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
US	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
Total FTE	11.34	11.34	11.34	11.34	12.84	13.34	13.3	13.3	14.0	15.0	15.0	15.0	16.0	17.0	18.0	18.0	18.0	18.0	18.0	20.0	20.0
Total Hour	136.1	136.1	136.1	136.1	154.1	160.1	160.1	160.1	168.1	180.1	180.1	180.1	192.1	204.1	216.1	216.1	216.1	216.1	216.1	240.1	240.1
mh/st	3.8	3.8	3.8	3.8	4.3	4.4	4.4	4.4	4.7	5.0	4.1	4.1	3.4	3.6	3.9	3.6	3.3	3.3	2.9	3.1	2.9
# Pts	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
7P-A																					
Chg RN	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RN/LVN	3	3	3.5	4	4	4	5	5	6	6	6	6	6	6	6	7	7	7	7	7	7
PCT	1.5	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	4	4	4
MT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
US	0.4	0.5	0.5	0.5	0.5	0.5	0.67	0.67	0.67	0.67	0.67	1	1	1	1	1	1	1	1	1	1
Total FTE	6.9	7.5	8.0	8.5	8.5	8.5	9.7	10.7	10.7	11.7	11.7	11.7	11.7	11.7	11.7	13.0	13.0	13.0	14.0	14.0	14.0
Total Hour	82.8	90	96	102	102	102	116	128	128	140	140	140	140	140	140	156	156	156	168	168	168
mh/st	3.8	3.9	4.0	4.1	3.9	3.8	4.1	4.4	4.268	4.5	4.376	4.2	4.1	4.0	3.9	4.2	4.1	4.0	4.2	4.1	4.0
Total Hour	218.9	226.1	232.1	238.1	256.1	262.1	276.1	288.1	296.2	320.2	320.2	320.2	332.2	344.2	356.2	372.1	372.1	372.1	384.1	408.1	408.1
Total mh/s	9.9	9.8	9.7	9.5	9.8	9.7	9.9	9.9	9.9	10.3	10.0	9.7	9.6	9.8	9.6	10.1	9.6	9.5	9.6	10.0	9.7

Appendix F

Morse Fall Risk Assessment Tool

Centennial Medical Center

FRHNUR147

MORSE FALL RISK SCALE SCREENING

Posted with permission from: Morse, JM, Morse, RM, Tylko, SJ. Development of a scale to identify the fall-prone patient. Canadian Journal on Aging. 8 (4): 366-367, 1989. Reprinted with permission. Http://www.utpjouornals.com/jou.ihtml?lp=cja/cja.html

		Points	Score			Points	Score
1. History of Falling				**4. Intravenous therapy/Hep/Saline lock**			
	No	0	____		No	0	____
	Yes	25	____		Yes	20	____
2. Secondary Diagnosis[1,2]				**5. Mental Status**			
	No	0	____	Oriented to own ability		0	____
	Yes	15	____	Overestimates/forgets limitations		15	____
3. Ambulatory Aid				**6. Gait**			
None/bed rest/nurse assist		0	____	Normal/bed rest		0	____
Crutches/cane/walker		15	____	Weak		10	____
				Impaired		20	____

☐ **Low Risk** Score 0 – 24 ☐ **Moderate Risk** Score 25 – 44 ☐ **High Risk** Score 45 & up **TOTAL:** ____

Nurse Signature: _____ ***Date:*** _____ ***Time:*** _____

Definitions of Variables for the Morse Scale

History of Falling: Yes (scored 25) if a previous fall is recorded during the present admission or if there is immediate history of physiological falls (i.e. from seizures, impaired gait) prior to admission.

[1] **Secondary Diagnoses**: Yes, if more than one medical diagnosis is listed on the patient chart. It is here that medications can be surmised that may contribute to falls, **e.g., seizure disorders** – anti seizure medications; **HTN & CHF** – diuretics; **anxiety** – benzodiazepines; **psychoses-dementia-** psychotropic drugs; **insomnia** – sedative-hypnotics; acute or **chronic pain** – narcotic analgesics **(HOWEVER ANY SECONDARY DIAGNOSES SHOULD BE CONSIDERED).**

[2] **If there are 'NO' Secondary diagnoses present,** the nurse assessing the patient's presenting signs & symptoms should **consult a pharmacist to rule out** any risk for falls. This may include patients undergoing bowel preps for colonic radiology studies or colonoscopies.

Ambulatory Aids:

Scored '0' if patient walks without a walking aid even if assisted by a nurse or is not on bed rest.
Scored '15' if ambulatory with crutches, cane or walker
Scored '20' if crutches for support

Intravenous Therapy:

Scored '20' if has an IV apparatus or heparin lock.

Mental Status:

Scored '0' The patient is asked if she/he is able to go to the bathroom alone of if she/he is permitted up. Patient's response is consistent with the ambulatory orders on the practitioner's orders.
Scored '15' The response is not consistent with the order or if the patient's assessment is unrealistic.

Gait:

Scored '0' Normal Gait – if patient is able to walk with head erect, arms swinging freely at the side, & strides unhesitant.
Scored '10' Weak Gait – if patient stooped but able to lift head while walking. Furniture support may be sought but is feather-weight touch; almost for reassurance. Steps are short, and the patient may shuffle.
Scored '20' Impaired Gait: - if patient stooped, may have difficulty rising from the chair, attempts to rise by pushing on chair arms and/or "bouncing." The patient's head is down, and because balance is poor the patient grasps the furniture, a person, or walking aid for support and cannot walk without assistance. Steps are short and patient shuffles. If patient is wheelchair-bound, the patient is scored according to the gait used when transferring from the wheelchair to the bed.

Appendix G

CITI Collaborative Institutional Training Initiative

Human Research Curriculum Completion Report

Printed on 9/25/2012

CITI Collaborative Institutional Training Initiative

Human Research Curriculum Completion Report
Printed on 9/25/2012

Learner: Lillian Roberts (username: rober807)
Institution: Regis University
Contact Information 12505 Lebanon Road
Frisco, Texas 75035 United States
Department: Nursing Administration
Phone: 972-963-3564
Email: kevinroberts4841@sbcglobal.net

Social Behavioral Research Investigators and Key Personnel:

Stage 1. Basic Course Passed on 09/25/12 (Ref # 8842210)

Required Modules	Date Completed	
Introduction	09/25/12	no quiz
History and Ethical Principles - SBR	09/25/12	4/5 (80%)
The Regulations and The Social and Behavioral Sciences - SBR	09/25/12	4/5 (80%)
Assessing Risk in Social and Behavioral Sciences - SBR	09/25/12	4/5 (80%)
Informed Consent - SBR	09/25/12	5/5 (100%)
Privacy and Confidentiality - SBR	09/25/12	5/5 (100%)
Regis University	09/25/12	no quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator

Appendix H

Registered Nurse Consent Letter

Letter of Consent

"What is the effect on patient outcomes and on patient falls risk when registered nurses are added to unit staffing?"

My name is Lillian Kathleen Roberts MSN, RN. I am a working towards my Doctorate of Nursing Practice Degree at Regis University. I am conducting a research study entitled "What is the effect on patient outcomes and on patient falls risk when registered nurses are added to unit staffing?"

I am asking for you to participate in this study because you are a Registered Nurse working on the Medical Surgical Unit at _____ hospital. Your participation is voluntary. Choosing not to participate will not affect your access to any goods or services or employment in any way. There are no direct benefits to participating in the study.

I will be conducting the study by asking you various questions that apply to your roles at_____. The questions are very basic regarding your skill level and knowledge. Participating in this study will take ten minutes of your time and will have no cost to you.

I will not be collecting any data that can link you to the answers you provide. Your anonymity and the confidentiality of your responses will be protected as much as possible. If you are uncomfortable answering any questions, you may choose to not answer that question or to further protect the confidentiality of your responses. Filling out the questionnaire will constitute consent to participate in the study.

Should you have any questions or concerns about participating in this study, you may contact me using the information in the first paragraph. My faculty Advisor is Dr. Louise Suit, EdD, RN, CNS, CAS; email: lsuit@regis.edu; phone: 800-568-8932, ext. 4187. You may also contact the Chair of the Regis University Institutional Review Board for human subject's participation by telephone at 303-346-4206; by mail at Regis University, Office of or by email at irb@regis.edu with question or concerns, or if you feel that participating in this study has resulted in some harm.

Sincerely,

Kathleen Roberts

Kathleen Roberts MSN, RN

Doctorate of Nursing Practice Student

Appendix I

IRB – Regis University

Approval Letter

REGIS UNIVERSITY

Academic Affairs
Academic Grants

3333 Regis Boulevard, H-4
Denver, Colorado 80221-1099

303-458-4206
303-964-5528 FAX
www.regis.edu

IRB – REGIS UNIVERSITY

March 1, 2013

Lillian Roberts
12505 Lebanon Road
Frisco, TX 75035

RE: IRB #: 13-084

Dear Ms. Roberts:

Your application to the Regis IRB for your project "What is the evidence that adding registered nurses to unit staffing will have on positive patient outcomes in the acute care setting?" was approved as an exempt study on March 1, 2013. This study was approved per exempt study categories 45CFR46.101.b(#2 and #4).

The designation of "exempt," means no further IRB review of this project, as it is currently designed, is needed.

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be resubmitted to the Regis IRB for approval.

Sincerely,

Patsy McGuire Cullen

Patsy McGuire Cullen, PhD, CPNP
Chair, Institutional Review Board
Associate Professor and Director
Department of Accelerated Nursing
Loretto Heights School of Nursing
Rueckert-Hartman College for Health Professions
Regis University

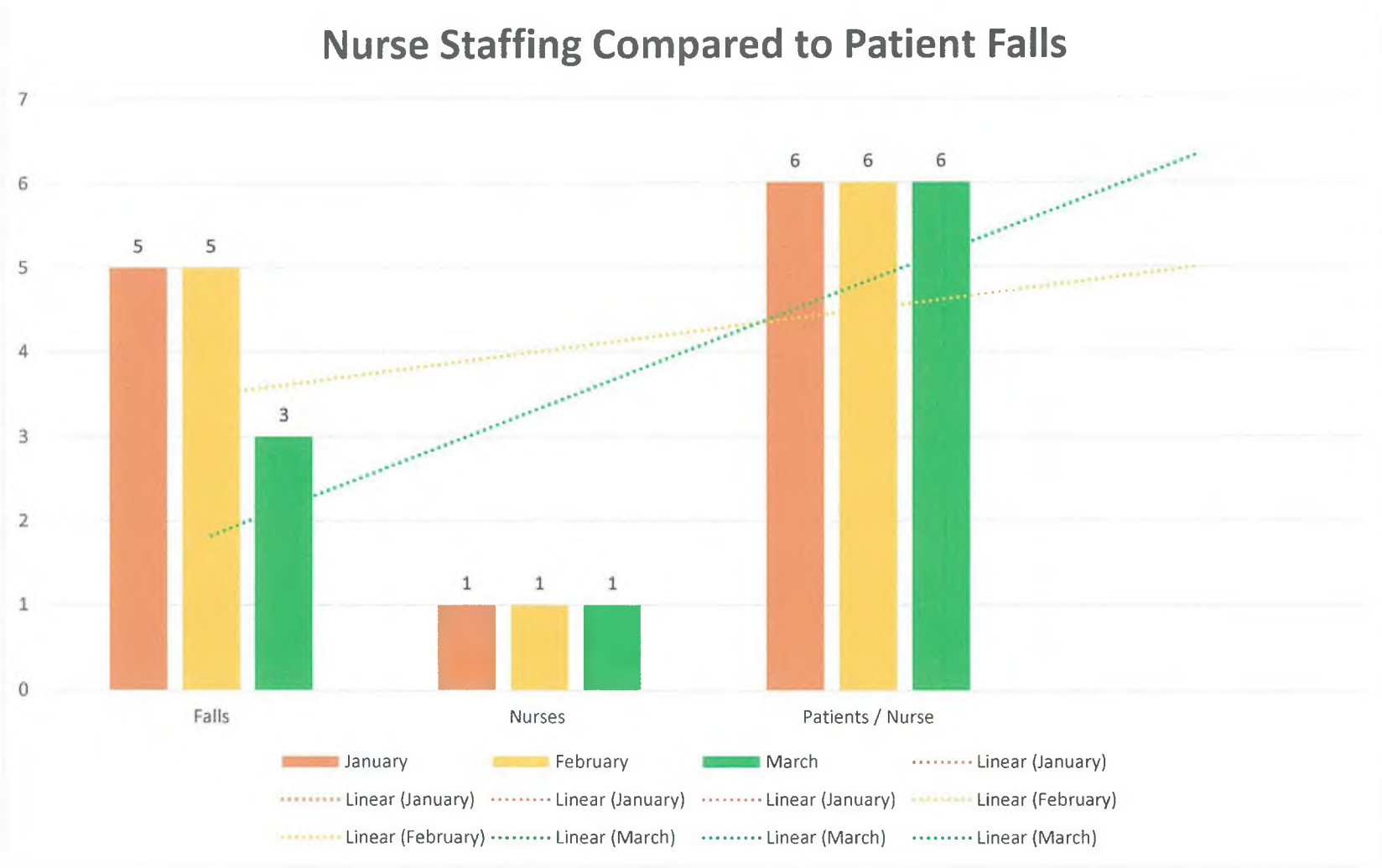
cc: Dr. Louise Suit

Appendix J

Nursing Staffing Compared to Patient Falls

Nurse Patient Ratio

By Month



Appendix K

Consent Letter

Agency Consent Letter

11/30/2012

To Whom It May Concern,

Lillian Kathleen Roberts MSN, RN Doctorate of Nursing Practice Student has requested permission to complete her Capstone Project at _____. It is my understanding that she will be conducting an exempt study that will involve the collection or study of existing data, documents, and records in which the information will be recorded in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects. I further understand that her project will be completed over a period of three months beginning January 01, 2013 through March 31, 2013.

There will be no funding for this project, nor any costs to the participants that consent to participate in Mrs. Roberts's exempt study.

As the Chief Nursing Officer at _____, I hereby give permission on behalf of _____ for Mrs. Roberts to complete her exempt study.

Best Regards,

Calee Travis, RN, MBA, CNOR, NEA-BC

Chief Nursing Officer

Appendix L

Timeframe

Timeframe

Start Date: December 01, 2013

End Date: March 31, 2013

List of Figures

```
GET
  FILE='C:\Users\Owner\Documents\NR706B_RobertsLK_Capstone Analysis.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
T-TEST
  /TESTVAL=0
  /MISSING=ANALYSIS
  /VARIABLES=Falls Nurses Patient
  /CRITERIA=CI(.95).
```

T-Test

[DataSet1] C:\Users\Owner\Documents\NR706B_RobertsLK_Capstone Analysis.sav

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Number of Falls	4	4.00	1.155	.577
Nurse	4	1.00	.000[a]	.000
Patient	4	5.00	.000[a]	.000

a. t cannot be computed because the standard deviation is 0.

One-Sample Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Number of Falls	6.928	3	.006	4.000	2.16	5.84

```
T-TEST PAIRS=Falls Nurses WITH Patient Falls (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

[DataSet1] C:\Users\Owner\Documents\NR706B_RobertsLK_Capstone Analysis.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Number of Falls	4.00	4	1.155	.577
	Patient	5.00	4	.000	.000
Pair 2	Nurse	1.00	4	.000	.000
	Number of Falls	4.00	4	1.155	.577

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Number of Falls & Patient	4	.	.
Pair 2	Nurse & Number of Falls	4	.	.

Paired Samples Test

		Paired Differences			
		Mean	Std. Deviation	Std. Error Mean	95% Confidence ... Lower
Pair 1	Number of Falls - Patient	-1.000	1.155	.577	-2.837
Pair 2	Nurse - Number of Falls	-3.000	1.155	.577	-4.837

Paired Samples Test

		Paired ... 95% Confidence ... Upper	t	df	Sig. (2-tailed)
Pair 1	Number of Falls - Patient	.837	-1.732	3	.182
Pair 2	Nurse - Number of Falls	-1.163	-5.196	3	.014

```
EXAMINE VARIABLES=Nurses BY Patient
  /ID=Falls
  /PLOT BOXPLOT STEMLEAF
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

```
[DataSet1] C:\Users\Owner\Documents\NR706B_RobertsLK_Capstone Analysis.sav
```

Warnings

Nurse is constant when Patient = 5. It will be included in any boxplots produced but other output will be omitted.

Patient

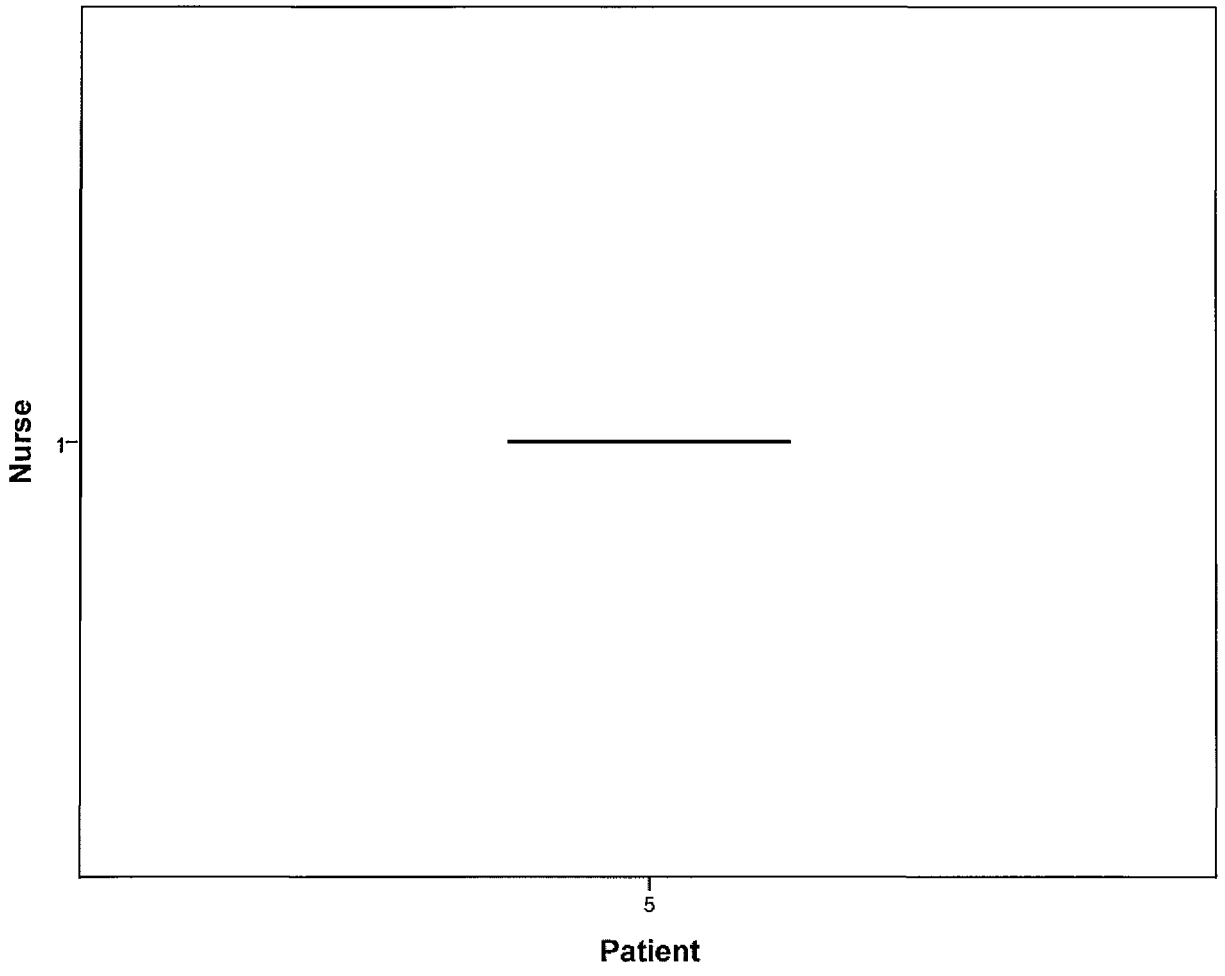
Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Patient	N	Percent	N	Percent	N	Percent
Nurse	5	4	100.0%	0	0.0%	4	100.0%

Descriptives[a]

a. Nurse is constant when Patient = 5. It has been omitted.

Nurse




```
EXAMINE VARIABLES=Falls BY Patient
  /ID=Nurses
  /PLOT BOXPLOT STEMLEAF
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

```
[DataSet1] C:\Users\Owner\Documents\NR706B_RobertsLK_Capstone Analysis.sav
```

Warnings

Number of Falls is constant when Patient = 5. It will be included in any boxplots produced but other output will be omitted.

Patient

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Patient	N	Percent	N	Percent	N	Percent
Number of Falls	5	4	100.0%	0	0.0%	4	100.0%

Descriptives[a]

a. Number of Falls is constant when Patient = 5. It has been omitted.

Number of Falls