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Patient to Nurse Ratios and Safety Outcomes for Patients

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Graduate Programs Final Project/Thesis

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PATIENT TO NURSE RATIOS AND SAFETY OUTCOMES FOR PATIENTS

BY

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A Master's Thesis Presented in Partial Fulfillment
Of the Requirements for the Degree
Master of Science, Health Service Administration

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FINAL APPROVAL OF MASTER'S PROJECT

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I have **READ AND ACCEPTED**

the Master's Thesis by:

Julie RinaldiFuller

Patient to Nurse Ratios and Safety Outcomes for Patients

Submitted in partial fulfillment of
requirements for the
Master of Science in Health Services Administration
degree at
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Primary Research Advisor: Michael Cahill MS

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Abstract

Hospital administrators are given the challenge of how to staff their hospitals cost effectively while maintaining a safe culture for the public. This study was conducted to determine the association between the patient to nurse ratio and safety outcomes for patients at one local institution. Three nursing units, providing different levels of patient care, were studied, looking at adverse events involving patients and what the patient to nurse ratio was during that time. The literature review supported lower patient to nurse ratios to deliver safe patient care. With nursing care critically impacting patient safety, it would be in the interest of the hospital administrator to staff their facility with a lower patient to nurse ratio as supported by the literature and previous studies. The results of this study, however, did not reveal an association. This particular hospital adheres to patient to nurse ratios supported by the American Nurses Association, providing patient care with a lower patient to nurse ratio than do some institutions.

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Chapter 1: Introduction

Patient safety is of utmost importance in hospitals today. The Joint Commission (JCO) is committed to improving the safety and quality of care provided to the public. This is being accomplished by providing health care accreditation and related services that support improved performance in healthcare organizations (New JCAHO Goals, n.d.).

Patient safety goals include improving the accuracy of patient identification, the effectiveness of communication among caregivers, improving the safety of using high-alert medications, eliminating medication errors, improving the safety of using infusion pumps and improving the effectiveness of clinical alarm systems (New JCAHO Goals). These JCO goals are in an effort to prevent a sentinel event, defined as an unexpected occurrence that involves death or serious physical or psychological injury, or the risk that these might occur (Adverse Courses, n.d.). The terms sentinel event and adverse event are used interchangeably with JCO adhering to the first term (New JCAHO Goals).

The restructuring of hospitals over the past decade shows a trend to provide the same level of patient care, if not increased levels of patient care, with fewer resources (Burke, 2003) (Heinz, 2004). This creates the problem of the nursing

staff in hospitals being most likely to have to withstand the impact of these down-sizing efforts (Burke). The workload for registered nurses is seen as an increase in patient to nurse ratios. Nurses have to care for more patients requiring greater attention and more skilled nursing.

Purpose

The purpose of this study is to determine the association between the patient to nurse ratio and safety outcomes for patients at a local institution in support of other studies.

Research Question

What is the association between patient to nurse ratios and safety outcomes for patients?

Null Hypothesis

There is no association between patient to nurse ratios and safety outcomes for patients.

Implications faced by health care administrators are the costs of providing safe quality health care while striving to be cost effective. Determining adequate staffing ratios and providing safe quality hospital care while maintaining budgets is a challenge for the health service administrator. Today's hospital administrator will find that patient to nurse ratios is a cost effective safety intervention. Higher staffing ratios

have resulted in a measurable impact on patient outcomes. Improved staffing ratios have been associated with a higher quality of care for hospitalized patients, fewer medications errors, a shorter length of stay, less nurse turnover and a lower patient mortality rate, all of these at a cost savings (Curtin, 2003).

Today's legislature is beginning to mandate what is adequate with 14 states having introduced legislation to limit patient to nurse ratios (Rothberg, Abraham, Lindenauer and Rose, 2005).

The New England Journal of Medicine (NEJM) (Needleman, Buerhaus, Mattke, Stewart and Zelevinsky, 2002), the Journal of the American Medical Association (JAMA) (Aiken, Clarke, Sloane, Sochalski and Silber, 2002), and the Joint Commission (New JCAHO Goals), in continued efforts to improve patient safety, have released studies stating unsafe staffing levels put patients at risk. The research released by NEJM, JAMA and JCO reports that the number of patients a nurse has to care for has a critical impact on the health of the patient (Stefanini, 2003). Blegen cites that "short staffing was related to poor outcomes and higher actual costs" (2006, p. 104). In a peer reviewed literature study, Lang, Hodge, Olson, Romano and Kravitz (2004)

found that a lower patient to nurse ratio, total nursing hours and skill mix affect some important patient outcomes.

Studies published in the New England Journal of Medicine (Needleman, et al., 2002), the Journal of the American Medical Association (Aiken, et al., 2002) and Joint Commission (New JCAHO goals) have shown that staffing ratios do matter for quality of care given and patient outcomes. According to a JCO report "when there are too few nurses, patient safety is threatened and health care quality is severely compromised" (Stefanini, 2003, p. 4). The NEJM, JAMA, and JCO have documented more adverse events occurring with lower levels of nursing staff to care for patients (Blegen, 1998). Increasing the patient to nurse ratio weighs heavily on the patient safety factor (Heinz, 2004). Lower patient to nurse ratios produce beneficial outcomes (Blegen). Reported benefits include fewer complications, fewer adverse events, shorter lengths of stay and an improved work environment for the registered nurse resulting in a lower nurse turnover (Public Policy Associates, 2004).

Nursing-sensitive outcomes are an indicator of quality of care. The Agency for Healthcare Research and Quality (AHRQ), the Centers for Medicare and Medicaid Services and the National Institute of Nursing Research jointly funded a study examining

the records of 1.1 million surgical patients and five million medical patients treated in 799 hospitals during 1993 (Stanton, n.d.). The principle findings of this AHRQ study (Hickam, Severance, Feldstein, Ray, Gorman, Schuldheis, Hersh, Pyle Krages and Helfand, 2003) revealed; (a) hospitals with high registered nurse staffing had lower rates of five adverse events for medical patients (pneumonia, urinary tract infections (UTIs), shock, upper gastrointestinal bleeding and longer hospital stays), (b) major surgical patients had lower rates of two adverse events (UTIs and failure to rescue), (c) three to twelve percent reduction in adverse outcomes, depending on the outcome, and (d) association with a two to twenty five percent reduction in adverse outcomes, depending on the outcome (Stanton, n.d.).

The costs of increasing the patient to nurse ratio are significant. Increasing the patient to nurse ratio affects the nurse, the patient and the health care organization. The impact of increasing the patient to nurse ratio for the nurse include stress, low morale, burnout and job dissatisfaction (emotional exhaustion and higher turnover rates). The impact for the patient include medication errors, adverse events, longer lengths of stay, lower quality of care, and increased mortality

rates. The health care organization, the hospital administrator, will see higher costs per discharge, higher staffing costs (overtime pay, temporary or agency costs, recruiting and training costs), decrease in quality of care the organization provides, loss of consumer satisfaction, and liability costs.

With the 1999 release of the Institute of Medicine's (IOM) report *To Err is Human: Building a Safer Health System* (Kohn, Corrigan and Donaldson, 2000), the public has become increasingly aware of how unsafe healthcare delivery can be. With this increased awareness, patient safety is in the forefront of healthcare delivery. With studies (Aiken, et al.) showing that a lower patient to nurse ratio results in fewer adverse events, this lower ratio (having a higher RN staffing mix) should be considered the standard. For the patient a lower patient to nurse ratio would signify an increase in safety and quality of care delivered. The health care organizations (the administrators) would see lower overall costs in the delivery of safe quality health care.

Chapter 2: Review of the Literature

The hospital administrator today faces many challenges in an effort to run their institution safely and efficiently, minimizing the likelihood of errors and maximizing the likelihood of being able to intercept them if and when error occurs (Kohn, Corrigan and Donaldson, 2000). These hospital administrators are charged with efficiently operating within their budgets while maintaining safe quality care for their patients (Clarke, Lerner, and Marella 2007). Organizations have embarked on programs to improve patient safety (Altman, Clancy and Blendon, 2004). The Joint Commission has established National Patient Safety Goals to encourage and help accredited institutions to address specific areas of concern regarding patient safety. These goals focus on preventing medical errors and improving patient safety and quality of care (New JACHO Goals, n.d.). The National Quality Forum has endorsed patient safety indicators developed by the Agency for Healthcare Research and Quality in their safety improvement efforts (Altman, et al., 2004). The ultimate purpose of these efforts is to protect the public.

Patient safety is a real challenge. One way in which patient safety may be improved is in establishing patient to

nurse ratios that will allow nurses to safely and efficiently care for their patients. Lower patient to nurse ratios will allow for improved patient outcomes.

Three primary stakeholders repeatedly arise in the literature with regard to those affected by the patient to nurse ratio and attempts to run hospitals efficiently. These three stakeholders are the hospital administrator, the registered nurse and the patient.

With costs rising in general, every effort is made to keep expenses down. One of the largest operating expenses a hospital administrator faces is that of labor. Using different levels of staffing mix to provide patient care have been experimented with. Staffing mix may be defined as the number of licensed personnel to unlicensed personnel, the richer the staffing mix, the higher number of licensed personnel. A richer staffing mix may be thought to cost hospitals more in wages paid. A richer staffing mix provides for a lower patient to nurse ratio and provides quality nursing care at either cost neutral or cost savings (Lang, et al., 2004).

Over the past two decades, attempts to keep costs down have seen health care systems restructuring significantly. Hospitals have merged, closed, restructured, and downsized. Through this,

hospital administrators had the nursing staff withstanding the impact of these efforts, attempting to provide patient care with fewer (human) resources (Burke, 2003). In the restructuring of the nursing staff, the registered nurse may be interchanged with licensed professional/vocational nurses (LPN/LVN) with the expectations that the same safe and quality of care will be provided (Blegen and Vaughn, 1998) (Prescott, 1993). This "do more with less" situation had the lesser licensed personnel sharing in more direct patient care duties (Heinz, 2004). Ultimately, this resulted in a lesser quality of care for the patient (Prescott, 1993).

What the hospital administrator saw to be a savings in overall labor costs actually cost them more (Lang, et al., 2004). Prescott (1993) reports comparisons in nurse staffing levels and mix. The richer registered nurse staffing mix was more cost effective. In 1990, labor represented 54.4% of hospital expenditures. Nursing accounted for 23% of total hospital labor. Labor costs have steadily declined since 1962 when labor represented 65.5%. The labor percentage of registered nurses has increased 5%. Overall, registered nurses have increased in percentage while labor costs have decreased, representing a richer staffing mix being cost effective vs. a

lower staffing mix. More recent research by Rothberg, et al. (2005) continues to support a higher staffing mix as being the most cost effective means in staffing for patient care in hospitals.

In staffing their institutions, the hospital administrator has a responsibility to be committed to safety and providing quality care to the public (Clarke, et al., 2007). This safety translates to quality of care for their clientele. Quality of care is seen with a richer staffing mix and lower patient to nurse ratios (Prescott, 1993).

In a study conducted by Hart Research Associates (2003), nurses believed that understaffing was a serious problem that affected the quality of care patients received. With understaffing nurses found that there was not enough time to comfort or assist patients and their families or educate them. Patients would have to wait longer periods of time for medications or procedures and there was a greater frequency of medication errors (Hart, 2003).

When the registered nurses were given more patients to care for, the hospital administrator saw a higher degree of job dissatisfaction, burnout and turnover in personnel (Aiken, et al., 2002). In having to manage an increased workload, job

dissatisfaction and burnout resulted in a turnover of the registered nursing staff. Poorer working conditions had registered nurses leaving their positions (Berliner and Ginzberg, 2002). The hospital administrator was faced with the problem of how to retain their registered nursing staff (Berliner and Ginzberg). With nurses leaving their positions, hospital administrators were faced with the (human resource) expenses of recruiting, hiring, orienting and training new employees thereby adding to their operating and labor costs (Aiken, et al., 2002) (Berliner and Ginzberg, 2002).

In the hospital setting, the nurses' position works with a variety of factors in their work environment. These factors include staffing mix, patient to nurse ratios, patient acuities and technology (Stanton, n.d.). A higher patient to nurse ratio may leave the registered nurse feeling as though she does not have enough time to deliver appropriate nursing care (Hart, 2003). Hospital nurses believe that understaffing, being responsible for too many patients, is a serious problem. They believe that caring for too many patients affects the quality of care patients receive. Staffing mix also affects the delivery of patient care. Staffing mix directs time available to care directly for patients (Blegen and Vaughn). In this staffing mix

the work experience of personnel may differ. There may be differences in length of service in a particular specialty or number of years at that institution (Hart, 2003).

Hospital care today has changed. New medical technologies and shorter lengths of stay have led to patients requiring more care from the nurse while in the hospital (Stanton, n.d.). High patient acuities affect a registered nurse considerably and should be considered in staffing ratios (Upenieks, Akhavan, Kotlerman and Esser, 2007). Working conditions associated with higher patient to nurse ratios makes for a poorer work environment (Aiken, et al., 2002).

Nurses with higher patient to nurse ratios, seen as a poor work environment, are more likely to experience job related burnout, being more dissatisfied with their jobs (Aiken, et al., 2002). High emotional exhaustion and physical exhaustion is also associated with burnout. Nurses working with higher patient to nurse ratios show higher burnout levels (Aiken, et al.) (Burke, 2003). With burnout comes job dissatisfaction, with job dissatisfaction, a higher turnover rate is seen (Aiken, et al.). Nurses are changing careers, seeking more attractive working conditions (Berlinger and Ginzberg). To retain these experienced

nurses, consideration should be taken regarding their work environment (Aiken, et al.).

Today, there is a nursing shortage. United States hospitals had an estimated 168,000 unfilled jobs in 2001. Of these, 126,000 were for registered nurses (Smith-Mello, 2007). The American Association of Colleges of Nursing fact sheet report this shortage may be as high as 500,000 by 2025. Today's nursing shortage is different from previous nursing shortages. The aging nursing workforce, a decrease in the enrollment in nursing schools, financial constraints in healthcare, hospital restructuring, hospital reengineering, challenges in recruiting nurses and challenges in retaining nurses have contributed to a nursing shortage within the hospital setting. The nursing shortage will increase over the next twenty years with the number of registered nurses approaching retirement (Heinz, 2004). Contributing to the nursing shortage has those traditionally seeking a career in nursing are choosing different fields with larger salaries and better working conditions (Lynn and Redman, 2005).

Thirty to 40 years ago, women entering the professional arena had the choice of being a teacher or a nurse (Berliner and Ginzberg, 2002). Today, a qualified woman may enter any

professional field. For example, women make up nearly half of entering medical school classes (Berliner and Ginzberg). While beneficial for women, nursing now must compete for educated women who have chosen alternative career options.

By 2020, the projected gap between supply and demand for registered nurses will be 808,000 (O'Neil and Seago, 2002). Improving the patient to nurse ratio will be a step in increasing the availability of nurses and narrowing this gap (Berliner and Ginzberg, 2002). Education will need to be more attractive and more available (Berliner and Ginzberg) (O'Neil and Seago).

With the nursing shortage ways must be found to enhance nurse recruitment. Nursing today offers opportunity to have close contact with people in caring for the ill and an intellectual challenge for dealing with disease and illness (Berlinger and Ginzberg, 2002).

Improving the work environment will make the career more attractive (Berliner and Ginzberg, 2002). Improving the patient to nurse ratio will improve the nurses' work environment, aiding in attracting new nurses to stay in the hospital setting (Aiken, et al., 2002) (Berliner and Ginzberg). As long as hospitals

under staff nursing units, the high turnover rate of hospital nurses will continue (Berliner and Ginzberg).

Nurses are retiring early or leaving the workforce for various reasons (Berliner and Ginzberg, 2002) (Kovner, Jones, Ahan, Gergen and Basu, 2002). Some are leaving the profession for better working conditions. Others are retiring in their mid to late 50s. Some, having grown children, no longer require two incomes for their families; others leave because of the physical demands of the profession and the lack of incentives for nurses to continue working (Berliner and Ginzberg).

Berliner and Ginzberg (2002) found that today's nursing shortage is a complex problem. The declining number of new nurses entering the workforce, attracting new nurses to stay in the hospital and nurses retiring or leaving the workforce must be addressed to resolve this shortage.

In the mix of stakeholders affected by the patient to nurse ratio, the patient is the most vulnerable. Patient safety continues to be of the utmost importance. Nursing care most directly affects patient safety with a lower staffing level being linked to adverse patient outcomes (Radwin, Washko, Suchy and Tyman, 2005) (Weissman, et al., 2007) (Berliner and Ginzberg, 2002) (Needleman and Buerhaus, 2003). Needleman and

Buerhaus (2003) found an association between total nursing hours of care or the number of registered nurses and six outcomes of medical patients. (These outcomes were length of stay, the rates of urinary tract infections, upper gastrointestinal bleeding, hospital acquired pneumonia, shock or cardiac arrest and the failure to rescue.) The higher the registered nurse mix, the lower the occurrence of adverse events reported on patient care units (Blegen, et al., 1998).

As hospitals respond to financial pressures, registered nurses have reported spending less time caring for increasingly ill patients and that safety and quality of patient care has deteriorated (Needleman, et al., 2002). The hospital patient of today is discharged earlier than was seen in the past. The past twenty years has seen a decline in the average length of stay from 11.7 days in 1980 to 6.8 days in 1999-2000 (Black and Pearson, 2002). According to Blue Cross Blue Shield (2004), the average length of stay has remained constant between 2000 - 2004 at 5.8 days in 2000 and 5.6 days in 2004. This same patient has higher needs during their shorter course of stay (Needleman, et al., 2003). Lower patient to nurse ratios and a higher proportion of registered nurses have proven to be significantly

related to a shorter length of stay for the patient (Lichtig, Knauf and Milholland, 1999).

Nursing care is a key factor in the outcomes of hospitalized patients (Blegen, et al., 1998). The number of patients a nurse cares for critically impacts the health of the patient. Lower patient to nurse ratios with a richer staffing mix of registered nurses consistently produced lower adverse outcome rates and is significantly related to a shorter length of stay (Blegen and Vaughn, 1998) (Blegen, et al.).

With a higher patient to nurse ratio poorer patient outcomes and higher costs are seen. When considering these staffing ratios, attention should be paid to the varying needs of the patients. Not all patients require the same level of nursing care (Graf, 2003). The literature continually cites the study by Aiken, et al. in which it is reported a 7% increase in mortality for each additional patient in the average workload of a registered nurse. Lower adverse outcomes were more related to a higher proportion of registered nurses.

The JAMA study by Aiken, et al. found that the higher the patient to nurse ratio in the hospital setting, the more likely there would be patient deaths or complications.

Surveys of (American) nurses offer a word of caution that an increase in patient to nurse ratio adversely affected the quality of care given to patients (Rothberg et al., 2005). Growing research validates the direct link between nurse staffing and patient outcomes (Rothberg et al.). Reported benefits include fewer complications and fewer adverse events. When there are too few nurses, patient safety is jeopardized and quality of health care is compromised.

In reviewing the literature, the pattern was that a lower patient to nurse ratio was safest for the patient. This lower ratio offered the best quality of care for the patient, afforded the most desirable working conditions for the registered nurse and was the most cost effective safety intervention the hospital administrator could implement (Greenberg, 2006). Nursing matters greatly in a hospital's ability to provide high quality care and prevent adverse outcomes; adequate human resources must be available to accomplish the task (Clarke, et al., 2007).

Chapter 3: Methodology

The issues discussed in the previous chapters focused on the impact of the patient to nurse ratio on three stakeholders, that of the hospital administrator, the registered nurse and the patient. The purpose of this study was to determine the association between the patient to nurse ratio and safety outcomes for patients at a local institution. The local institution for this study was Boulder Community Hospital, Broadway Campus.

The statistical analysis to be used in this study was the chi squared test of association. Chi square is a nonparametric statistic requiring the ability to classify cases into a set of categories (Newton and Rudestam, 1999). This test allows two attributes in a sample of data to be compared to determine if there is any association between them (Kranzler, 2003).

Internal Review Board (IRB) approval was received. Facility permission to use their data was obtained. Data was collected once approval and permission were obtained. The study included three in-patient care units at Boulder Community Hospital, Broadway Campus: ICU, telemetry and med/surg. These three patient care units were decided on in an effort to cover different levels of nursing care.

De-identified secondary data was collected. In using de-identified secondary data, patient confidentiality was maintained. In using this secondary data, the study was a retrospective causal comparative validation study, reviewing data from 2007. This type of study attempts to identify a causative relationship between an independent variable and a dependent variable (Gay, Mills and Airasian, 2006).

The variables for this study were safety outcomes for patients as the dependent variable and patient to nurse ratios as the independent variable. Shift reports show nurse assignments (the number of patients assigned for each nurse) for each shift. Shift reports for these units were reviewed to ascertain whether or not the patient to nurse ratio was met.

The variable 'patient to nurse ratio met' is defined as a nurses' patient assignment being at a number of patients so as to adhere to the ratios suggested by the ANA (Appendix A). The patient to nurse ratio was used to determine whether a safe ratio was met. In contacting the American Nurses Association (ANA), it was found that the patient to nurse ratios suggested were those introduced by Representative Jan Schakowsky (D-IL), endorsing H.R. Bill 2123 (Anonymous, 2007). Further research revealed that the ANA did not recommend specific numeric ratios

but did develop the Principles for Nurse Staffing, a tool to gauge appropriate staffing. These principles would look at the number of patients to be cared for, the level of experience of the nursing staff, the acuity levels of the patients and what resources and support services were available to the nurses (Price and Cooke, 2005). The bill in legislation is H.B. 1372, the Quality Nursing Care Act of 2005, and was introduced March 17, 2008.

Units of measure for this study were the twelve hour nursing shift. There are two twelve hour shifts (day shift and night shift) in a twenty four day for each of the three nursing units. The time period for the sampling was, January 1, 2007 through December 31, 2007.

Data collected for the three units was through the review of shift reports, noting whether or not the suggested patient to nurse ratio was met. The date and shift were noted on two by two tables (Appendix B).

The Risk Management Department at BCH was able to provide a summary report of occurrences for the three nursing units under study. This report had occurrences broken down by unit and categorized by event, i.e.: medication errors, falls, skin/tissue, etc. In reviewing the summary occurrence report, it

was then a matter of eliminating (excluding) occurrences not involving those patient safety measures identified, tallying those occurrences involving patient safety and applying the occurrence to the specific unit and shift on the same two by two tables used to collect the shift report data. These two by two tables tracked whether there was an occurrence, if the patient to nurse ratio was met or not, the unit, and the shift of the occurrence. Once completing both of these tallies, a data set was created to be analyzed using the SPSS software package. The data collected was converted to the two variables, "ratiomet" and "#events". The overall tally had ratio met at 1,380, ratio not met at 714. The total number of safety events was 96.

In reviewing the reported occurrences, it was found that only three of the five safety measures were included, medication errors, falls and wound infection. No pressure ulcers or nosocomial infections were reported during the study time. If patient safety was not involved, the occurrence was excluded. Using only these three nursing units, other areas of the hospital were excluded from the study. Researcher bias was planned to be reduced by excluding the in-patient unit the researcher worked on.

Once all the data had been aggregated within the tables and transferred to the data set, data was analyzed using SPSS statistical software, noting the p value of the chi square test. A p value of less than 0.05(alpha) denoted an association between patient to nurse ratios and safety outcomes for patients, supporting the hypothesis. A p value greater than 0.05 represented no association between the two variables, in support of the null hypothesis. SPSS software was available through Regis University or through a lease program with SPSS.

Chapter 4: Results

The design of this study was to investigate the relationship between two variables. A generalization of sample information to a population was studied, a statistical inference. The independent variable in this study was the patient to nurse ratio, the dependent variable was safety events involving patient safety. The dependent variable was the focus of the study as it is the variable that could be measured in response to manipulating the independent variable.

The sample size was 2,190. This was derived from using three nursing units, looking at two shifts per day for 365 days - $3 \times 2 \times 365 = 2,190$. The data set compiled consisted of three columns. The first column was "ratio met". A "1" in the column indicated that the ratio was met. A "0" indicated the ratio was not met. The second column was "#events", indicating whether or not a safety event occurred with a "0" indicating no event and a "1" indicating a safety event occurred. A third column was used to identify the unit, 1 = ICU, 2 = telemetry, 3 = med/surg.

For all three units, 96 events occurred. Of these 96 events, 41 occurred when the suggested patient to nurse was not met, 55 occurred when the suggested ratio was met. In the ICU, no events occurred when the ratio was not met. Their 15 events occurred

when the suggested patient to nurse was met. The telemetry unit reported 48 events. Thirty of these events occurred when the patient to nurse was not met, 18 events occurred when the suggested ratio was met. And, med/surg reported a total of 33 events. Eleven of these events occurred when the patient to nurse ratio was not met, 22 occurred when the ratio was met.

Chi square testing was chosen as the research was to determine if there was an association between the two variables. Chi square testing requires only the ability to classify cases into a set of categories, nominal measurement (Kranzler). Did the patient to nurse effect patient safety outcomes?

The analysis (Appendix C) reports the results of the three units as a whole and by individual unit. The overall results for the three units combined were there was no association between the two variables. Chi square $X(N = 2,190) = 3.013$, $p = 0.083$, $\alpha = 0.05$.

Looking at individual unit results also revealed no association between the two variables. Unit 1, ICU, $X^1(1, N = 730) = 0.234$, $p = 0.628$, greater than alpha. Unit 2, telemetry, $X^2(2, N = 730) = 1.978$, $p = 0.160$, greater than alpha. And, unit 3, med/surg, $X^3(3, N = 730) = 0.126$, $p = 0.722$, also greater than alpha.

The overall results, as well as the individual unit results, report there is no association between the two variables. There is no association between patient to nurse ratios and safety outcomes for patients at this institution. The hypothesis for this study is rejected. The null hypothesis is accepted as being true.

Chapter 5: Discussion

This study's original question was to ascertain if there was an association between patient to nurse ratios and the number of safety outcomes for patients. The research conducted found that, at this particular institution, there was no association between the nurse ratio being met and whether or not a safety event occurred. The institution where the research was conducted adheres to the patient to nurse ratios supported by the American Nurses Association which would imply the patient to nurse ratio is at a safe working level. The null hypothesis states there is no association between patient to nurse ratios and safety outcomes for patients. The null hypothesis is accepted as being true.

The literature supports that lower patient to nurse ratios utilizing a richer staffing mix, are cost effective in providing quality and safe patient care (Lang, et al., 2004). In staffing their institutions, the hospital administrator has a responsibility to be committed to safety and providing quality care to the public (Clarke, et al., 1997). This safety translates to quality of care for their clientele. Quality of care is seen with a richer staffing mix and lower patient to nurse ratios (Prescott, 1993).

The literature supports that understaffing is a serious problem that does affect the quality of care patients receive. Higher patient to nurse ratios may leave the registered nurse feeling as though she does not have enough time to deliver appropriate nursing care, affecting the quality of care she is able to give. Nursing care is a key factor in the outcomes of hospitalized patients. The overwhelming repetitive pattern in the literature review was that a lower patient to nurse ratio was safest for the patient. In staffing their institutions, hospital administrators will find it in their facility's best interest to use a richer staffing mix to provide safe quality care to their public.

This study did not find there to be an association between patient to nurse ratios and safety outcomes for this institution. The literature supports there is an association. The one institution studied adheres to the suggested lower patient to nurse ratio in an effort to keep their population safe.

To improve this study, sampling multiple institutions in the region could have been used. In this multiple institution sampling, a more diverse sample could be obtained, giving a broader view of working conditions and a better representation

of the region. Other factors contributing to patient safety may be considered in this type of study. These factors may include the acuities of the patients the registered nurse is caring for. Acuity levels associated with adverse events for a particular level of nursing may be studied. One may question whether a patient should have been transferred to a higher level of care earlier. With patients being increasingly ill, the nurse may be caring for a patient that should be transferred to a higher level of care. When a nurse has a high acuity patient to care for, along with other patients to care for, the situation is open for potential error. The practical experience of the nurse is another factor to be studied.

Future areas that may be studied with a relationship to patient safety may be to know whether more events occur on the night shift vs. the day shift. Job satisfaction may be studied to determine if nurses under the stressor of high patient to nurse ratios make more mistakes. Emotional exhaustion is another variable that may be a contributor to error with regard to patient safety.

Another limitation to this study is the ethical reporting of errors. In not wanting to admit to error, one may question how many errors go unreported. The literature reviewed did not

comment on this. Ethical reporting is an important issue to study by itself and is an area for future research.

The overall findings of this study found no association between the two variables. At this institution, patient to nurse ratios were not associated with safety outcomes for patients. The literature does report that when a person has too many tasks to complete, it opens up the situation for error (Lang, et al.).

Given a richer staffing mix and a lower patient to nurse ratio, everyone benefits. A lower rate of adverse events transpires, the length of stay would not increase and actual costs would be at a minimum. Quality of care and patient safety would not be compromised. Hospital patients will not suffer avoidable adverse outcomes. The nurse would not feel overwhelmed with an overpowering, demanding workload (Aiken, et al.).

It would behoove the hospital administrator to invest in the registered nurse staffing to avert preventable mortality and to retain their registered nursing staff with experience (Aiken, et al., 2002). In their investment of a richer staffing mix, higher costs through adverse outcomes can be avoided. The registered nurse will benefit in being assigned a safe and manageable work load. The patient will receive safe quality care

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Appendix A

Nurse Staffing Standards for Patient Safety and Quality of Care

Act of 2997 (H.R. 2123)

- 1:1 Operating Room and Trauma Emergency Units
- 1:2 Critical Care Units, Emergency Critical Care, Intensive
Care Units, Labor and Delivery Units and PACU
- 1:3 Ante partum, Emergency Room, Pediatrics, Step-down,
Telemetry
- 1:4 Intermediate Care Nursery, Medical/Surgical, Acute Care
Psychiatric
- 1:5 Rehabilitation
- 1:5 Postpartum (3 Couplets), Well-baby Nursery

Appendix B

	No #events	#events
Ratio not met		
Ratio met		

Appendix C

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
ratiomet * #events	2190	100.0%	0	.0%	2190	100.0%

ratiomet * #events Crosstabulation

Count		#events		
		0	1	Total
ratiomet	0	714	41	755
	1	1380	55	1435
Total		2094	96	2190

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.013 ^a	1	.083		
Continuity Correction ^b	2.644	1	.104		
Likelihood Ratio	2.923	1	.087		
Fisher's Exact Test				.099	.054
Linear-by-Linear Association	3.012	1	.083		
N of Valid Cases	2190				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 33.10.

b. Computed only for a 2x2 table

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
rationet * #events * unit	2190	100.0%	0	.0%	2190	100.0%

rationet * #events * unit Crosstabulation

Count

			#events		
			0	1	Total
1	rationet	0	11	0	11
		1	704	15	719
		Total	715	15	730
2	rationet	0	491	30	521
		1	191	18	209
		Total	682	48	730
3	rationet	0	212	11	223
		1	485	22	507
		Total	697	33	730

Chi-Square Tests

unit		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
1	Pearson Chi-Square	.234 ^a	1	.628	1.000	.795
	Continuity Correction ^b	.000	1	1.000		
	Likelihood Ratio	.460	1	.497		
	Fisher's Exact Test					
	Linear-by-Linear Association	.234	1	.629		
	N of Valid Cases	730				
2	Pearson Chi-Square	1.978 ^c	1	.160	.186	.109
	Continuity Correction ^b	1.541	1	.214		
	Likelihood Ratio	1.884	1	.170		
	Fisher's Exact Test					
	Linear-by-Linear Association	1.976	1	.160		
	N of Valid Cases	730				
3	Pearson Chi-Square	.126 ^d	1	.722	.703	.427
	Continuity Correction ^b	.026	1	.871		
	Likelihood Ratio	.124	1	.724		
	Fisher's Exact Test					
	Linear-by-Linear Association	.126	1	.722		
	N of Valid Cases	730				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is .23.

b. Computed only for a 2x2 table

c. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.74.

d. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.08.