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Registered Nurse Engagement and Patient Falls in the Acute Care Setting

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2020

Abstract

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BSN, Creighton University, 2005

MSN, Clarkson College, 2011

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of the Requirements for the Degree of

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Abstract

Falls are a critical problem for inpatient medical-surgical adult patients. Past research has indicated a link between nurse disengagement and unsafe care. The purpose of this study was to improve the understanding of the relationship between nurse engagement and patient falls with injury on medical surgical units in health care facilities in the United States using the National Database of Nursing Quality Indicators. Retrospective data were reviewed from 13 U.S. hospitals in the Midwest covering Q1 (2018) and Q2 (2018) on medical-surgical units related to nurse engagement and patient falls. A correlational and MANOVA design was used to determine the relationship between nurse job engagement and patient fall rate. The Nursing work-life model was developed with the purpose of addressing the nurses work environment, which affects engagement and patient outcomes. The research questions were designed to determine whether a statistically significant relationship existed between patient falls and nurse engagement factors. The analysis of this study showed that there was no statistically significant relationship between engagement factors relating to the registered nurse forcing themselves to come to work, administrators consulting them daily, and the ability of the registered nurse to adjust their practice and patient falls. However, the analysis suggested nursing hours per patient day was a significant predictor of unassisted fall rate, although the correlation with injury was not statistically significant. The findings may be used by nursing administrators to develop interventions to improve patient outcomes.

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Chapter 1: Introduction to the Study

Introduction

Falls are a critical problem for inpatient medical-surgical patients 18 years of age and older. Falls significantly affect not only the patients who fall, but also the family members, insurance agencies, the health care facility, and the health care providers.

Inpatients who fall have psychological, physical, and financial burdens as a result of a fall (Lim et al., 2018). The crippling effect of falls in inpatient medical surgical units has contributed to poor quality of life for the patient and their family members in addition to increased health care costs (Dunne, Gaboury, & Ashe, 2014; Majkusova, & Jarosova, 2014). Bouldin et al. (2013) reported that 315,817 falls occurred during 2 years in approximately 6,100 medical-surgical units. Of these falls, 82,000 resulted in injury. Approximately 1 in 1,000 patients who fell had a residual injury. Consequently, it is necessary for hospital leaders to identify and implement ways to reduce falls and the complications that result from the falls.

Inpatients depend on nursing staff to care for them and maintain their safety. Thus far, not much is known about the influence that nurse engagement may have for inpatient medical-surgical patients 18 years of age and older. There is a growing consensus among the health care realm that engaged nursing staff are vital in providing quality care to patients. Registered nurses who are engaged result in better health outcomes for their patients, including falls (Dempsey & Reilly, 2016; Van Bogaert et al., 2014). Annually,

more than 2000 health care facilities in the United States participate in the National Database of Nursing Quality Indicators (NDNQI) survey, which has a strong component of nurse engagement. The availability of this data offers the ability to analyze how nurse engagement may influence patient outcomes, specifically patient falls.

Positive social change implications include the knowledge that health care administrators will gain from this study that may lead to a focus point for reducing falls: nurse engagement. In addition, the organizational processes that may be implemented because of the findings of this study will be aimed at nurse engagement that will not only improve patient falls but improve patient outcomes in general. Chapter 1 contains an overview of the study including the social change implications, background, problem statement, the purpose of the study, research question, and hypothesis. In this chapter, I will also cover the framework for the study, definitions of terms used, assumptions, delimitations, limitation, significance, and summary.

Background

Patients in medical surgical units in health care facilities depend on nurses for their care and safety. In 2016, there were 35,158,934 admissions to United States hospitals (American Hospital Association, 2017). RNs spend approximately 24.5% of their time providing direct patient care in the acute care setting and 60.5% of their time providing indirect care (Swinger, Vance, & Patrician, 2016). Indirect care consists of related patient care tasks, but not hands on. Examples of this includes things such as paging a doctor regarding the patient, talking with the laboratory staff regarding the

patients' lab results, and looking up policies to direct a specific direct care action. During the time that the patient is in the hospital, the patient expects to receive high-quality care in a safe environment that prevents accidental hazards that may increase the risk of a fall (Twibell, Siela, Sproat, & Coers, 2015). The quality of care may not be met if the patient experiences a fall. Due to the negative long-term ramifications of falling for the patient, family, and health care facility, it is imperative to investigate ways to reduce the risk of falls and fall-related complications by exploring the influence of nurse engagement on fall rates.

Adverse outcomes, particularly with falls, cost patients and organizations thousands of dollars for additional care and affect patient's quality of life (Bouldin et al., 2013; Dunne et al., 2014). Between 700,000 and 1 million falls occur in hospitals each year, and one-third of those falls can be prevented according to the Agency for Healthcare Research and Quality (2013). Approximately 30% to 50% of falls result in injury (The Joint Commission, 2015). Falls in the hospital add approximately 8 additional days to the patients' hospital stay and an additional $7,000 (Morello et al., 2015).

Patient falls are at the top of The Joint Commissions list of sentinel events. In 2017, there were 114 deaths from falls (The Joint Commission, 2018). This number has been steadily increasing since 2005. Therefore, it is imperative to identify strategies that will prevent falls in inpatients.

Problem Statement

The problem is that the influence of nurse engagement on the incidence of falls with injury in medical surgical units in United States health care facilities is unknown. There are approximately 3 million nurses in the United States (Bureau of Labor Statistics, 2018). Those nurses spend on average 80% to 90% of their time ensuring patients are safe and preventing harm (Swinger, Vance, & Patrician, 2016). Though nurse disengagement has been linked to unsafe care (Kurtney-Lee et al., 2016; Dempsey & Reilly, 2016), little is known about how nurse engagement affects patient outcomes, particularly falls with injury. This study may help to fill this gap by using secondary data to measure the relationship between nurse engagement and patient falls during a 1-year period in medical-surgical units in United States health care facilities.

Organizations placing importance on employee engagement outperform other hospitals in terms of job satisfaction, retention, profitability, and performance (Harter, Schmidt, & Hayes, 2004). Dempsey and Reilly (2016) stated that of every 100 nurses, 15 are engaged with their job. This suggests that 85% may not be engaged. This is much higher than the overall 32% disengagement rate for U.S. employees (Gallup, 2016). Patient falls within the hospital setting are one of the most common reasons for increased complications and longer length of stay (Dunne et al., 2014). The World Health Organization (2018) reported that an estimated 646,000 fatal falls occur every year, which makes falls the second cause of accidental injury deaths worldwide. Because

nursing plays a key role in providing high quality safe and cost-effective care, it is important to understand the relationship between nurse engagement and patient falls.

Purpose of the Study

The purpose of this retrospective quantitative study was to assess nursing factors that may influence patients falls in a hospital setting. I used secondary data to determine whether nurse engagement influences fall rates on adults in medical surgical units in United States health care facilities. The purpose of this study is to examine the correlation between nurse engagement ratings on medical surgical units and the frequency of falls on those same units during the same period. In this study, I will seek to improve the understanding of the relationship between nurse engagement and patient falls with injury on medical surgical units in United States health care facilities.

Research Questions and Hypotheses

The research question for this study was:

RQ1: Is there a significant variance between the groups with respect to Consultation of Nursing Administrators by RNs in units and facilities under study for Q1 and Patient Falls Per 1000 Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls?

H_o1: There is no statistically significant variance between the means of the groups on Consultation of Nursing Administrators in the facilities studied for Q1, 2018 and Patient Falls Per 1000 Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls.

H_a1: There is a statistically significant variance between the means of groups on Consulting of Nursing Administrators in the facilities and units under study for Q1, 2018, and Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

RQ2: Is there a significant variance between groups on RNs Forced to Come to Work in facilities and units under study for Q1 and Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls?

H_o2: There is no statistically significant variance between means of groups on RNs Forced to Come to Work in facilities and units under study for Q1, and Total Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

H_a2: There is a statistically significant variance between means of the groups on RNs Forced to Come to Work in facilities and units under study for Q1, and Total Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

RQ3: Is there a significant variance between groups on RN Freedom to Adjust Practice in units and facilities under study in Q1, and Number of Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls?

H_o3: There is no statistically significant variance between group means on RN Freedom to Adjust Practice in units and facilities under study in Q1, and Number

of Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls.

H_a3: There is a statistically significant variance between group means on RN Freedom to Adjust Practice in units and facilities under study in Q1 Number of Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls.

RQ4: Is there a significant relationship between education, HPPD and certification in Q1-Q2 and influence on patient/fall outcomes in Q1-Q2?

H_o4: There is no statistically significant variance between RN Education and Certification and Total RN Nursing Hours Per Patient Day in Q1-Q2 and each of 3 patient fall/injury outcomes namely Patient Falls Per 1000 Patient Days, Patient Injury Falls Per 1000 Patient Days and Unassisted Patient Falls.

H_a4: There is a statistically significant variance between RN Education, Certification, Total RN Nursing Hours Per Patient Day in Q1Q2 and each of 3 patient fall/injury outcomes namely Patient Falls Per 1000 Patient Days, Patient Injury Falls Per 1000 Patient Days and Unassisted Patient Falls.

Theoretical Framework

The theoretical base for this study was the Nursing Work-life Model (NWLM). This framework was developed by Leiter and Laschinger (2006) to address the relationship between the nurses' work environment, which affect burnout and engagement with patient safety outcomes. The NWLM describes the interrelationship

between five elements in the practice environment affect personal accomplishment, depersonalization (burn-out), and emotional exhaustion. These elements include "strong nursing leadership, RN-MD collaboration, policy involvement, staffing adequacy, and nursing model of care" (Ballard, Boyle, & Bott, 2015, p.3). All these elements in the model are interrelated with the main purpose of allowing for a conducive practice environment that would affect emotional exhaustion and in effect lead to a sense of nurse engagement in their duties and promote positive patient safety outcomes, such as falls. A more detailed analysis of the five factors is reported in Chapter 2.

Utilization of a nursing model directly influences employee adequacy, engagement, and personal accomplishment. The concept implies that a nursing-based model of care ensures adequate nurse staffing levels, and empowerment to realize the nursing need of patients and also allow nurses to offer high-quality care (Manojlovich & Laschinger, 2007). The element of adequate staffing facilitates increased feelings of accomplishment by the nurses, and subsequently results in better nurse and client outcomes (Manojlovich & Laschinger, 2007). Overall, the model results in the personalization of nursing tasks, relationship building, personal accomplishment, and overall engagement of nurses in their roles.

Many of the theoretical frameworks used to predict or explain relationships connecting nursing, environment, and outcomes normally assume the common structure-process-outcome model (Donabedian, 2005). The frameworks offer comprehensive direction for health care professionals and researchers with interest in the course through

the process to the final outcome. However, the models have one major shortcoming. The model models fail to adequately conceptualize the environment in sufficient detail, such that those interested in establishing work settings that support nursing can utilize them as templates. The following study will use the NLWM, which is an alternative theoretical framework that offers a more comprehensive depiction of the interrelationships between the various domains at play in the nursing work environment.

The NLWM is an emerging theoretical framework, based on the identified five major hospital domains. The use of the five domains enables a description of the relationships between patient safety outcomes and nursing work environment (Roche, Laschinger & Duffield, 2015). The five work life elements identified by Leiter and Laschinger (2006), as attributes of professional RN nursing practice environments act on each other and influence the patient outcomes by the burnout/engagement process.

The choice of the model suits the current study in that the framework configures the various domains in such a manner that the underlying mechanisms respond to the purpose of this research. For instance, the model demonstrates how one domain interacts with another, and ultimately provides guidance on how to shape existing hospital environment to improve the quality of nurses' work lives, as well as the overall patient outcomes, including reduced falls.

Nature of the Study

This study was retrospective quantitative study in which I used secondary data from NDNQI on United States health care facilities. Quantitative research is consistent

with reviewing retrospective data to examine the relationship between nurse engagement and patient falls, which was the primary focus of this dissertation. This quantitative research determined a significant relationship between nurse engagement and patient fall rates. I used the data from U.S. hospitals covering Q1 (2018) and Q2 (2018) on medical-surgical units prepared for the NDNQI database for nurse engagement and patient falls. I also used a correlational and MANOVA design to determine the relationship between nurse job engagement and patient fall rate.

Definition of Terms

These terms are operationalized in this study:

Fall: unplanned decent to the floor with or without injury" (Press Ganey Associates, Inc. 2018). Nursing fall rates are calculated per 1,000 patient days.

Nurses: Refers to a rregistered nnurse (RN).

Nurse eengagement: Refers to the nurses commitment to and satisfaction of their jobs and includes a commitment to the organization in which they work, and their commitment to the nursing profession itself (Dempsey & Reilly, 2016).

Registered nnurse (*RN*): An individual who has graduated from a state-approved school of nursing, passed the NCLEX-RN examination and is licensed by a state board of nursing to provide care (National Council of State Board of Nursing, n.d.).

Assumptions

The assumptions of this study are aspects that I believe to be true that will assist the readers in interpreting my data within my study. Another assumption is that leaders in

health care, particularly concerning medical surgical units, are interested in learning more about what contributes to falls and how to reduce fall-related injuries. If a health care facility does not have adequate strategies in place to prevent falls, injuries related to falls will continue. In this study, I assumed the following:

- All medical surgical staff know what is considered a fall.
- Nurses documented every fall according to facility policy.
- Nursing staff reported true feelings regarding job engagement.

Scope and Delimitations

The scope of this study was limited to quantitative data from U.S. surgical units for fall rates and nurse engagement scores The scope of this study consisted of adults age 18 and older admitted to inpatient medical surgical units. The delimitations of this study are that I obtained data from only the United States. In addition, the falls data is based on falls reported by the nursing staff. It is possible that unreported falls happened.

Limitations

Limitation of this research are that this study only includes hospitals in the United States. Therefore, this study may be limited in generalizability to health care facilities outside of the United States or other health care facilities in the United States, such as surgery centers or rehabilitation centers.

Significance

This research fills a gap in understanding by focusing specifically on nurse engagement and falls with injury on medical surgical units in United States health care

facilities. This project is unique because it addresses an under-researched area of patient falls concerning nursing engagement in United States health care facilities. Insights from this study can be used by administrators to decrease falls in their respective health care facilities. Falls in the hospital add approximately 8 additional days to the patients' hospital stay and an additional $7000 (Morello, et al., 2015). Possible social change may be found in determining if nurse engagement influence fall rates on medical surgical patients. This research informs the organizational-level of evidenced-based interventions. These interventions are aimed at improving patient outcomes by promoting nurse engagement. Globally, these findings are generalizable to other health care organizations in examining nurse engagement and patient falls.

The data used in the study was derived from National Database for Nursing Quality Indicators (NDNQI) database, which is a national database designed to measure the quality of nursing practice and patient safety (Press Ganey Associates, Inc., 2018). The database is an initiative of the American Nurse Association, managed by experts and focus groups across the country. The nature of the database, standards, policies, and procedures facilitate and ensure submission and storage of quality data. Additionally, the ANA renders credence to the validity and reliability of the data that was used in this study. A detailed analysis of the validity and reliability of measures in this study is provided in Chapter 3.

Summary

With a drive toward maintaining accreditation standards and achieving excellence ratings, health care organizations are focused on quality and cutting expenditures (Keyko, Cummings, Yonge, & Wong, 2016). Studies show that nurses play key roles in overall quality of care, including, but not limited to, safety and reducing the length of stay. (Atefi, Abdullah, Wong, & Mazlom, 2014; Moorhead, Johnson, Maas, & Swanson, 2014; Choi & Boyle, 2013). When nurses have a positive perception of their job, then there is a higher likelihood, they will provide high-quality care (Van Bogaert et al., 2014). Van Bogaert further reported there are associations between nurses perceptions of their job and quality of care, specifically with nurse-reported patient falls. Consequently, understanding the influence that nurse engagement has on fall rates for this population may help health care leaders to know where to spend money and resources to decrease the risk of falls.

Chapter 2: Literature Review

Introduction

In this literature review, I examine the association between nursing engagement and patient falls through the lens of the NWLM. In this model, various work practice environment elements link through distinct pathways, suggesting an eventual causal link to nurse emotional exhaustion/burnout that is argued to be the opposite of nurse engagement. In the literature review, I then address into nurse engagement, and then I consider patient safety outcomes about the NWLM. Studies that have been conducted on fall risk factors, as well as fall prevention, are also analyzed. I then consider findings from nursing excellence research as the panacea for adverse events.

Literature Search Strategy

Search terms for the literature review were on the subject of "falls in an inpatient setting concerning nurse engagement." The keywords and phrases included *inpatient falls; nursing engagement; nursing engagement and patient outcomes; inpatient falls and nursing engagement; nurse burnout; nurse emotional exhaustion; nurse depersonalization; fall risk factors; fall prevention strategies;* and *nursing models of care*. I used vvarious ssources to find relevant articles. To gather the articles, searches were conducted on Google Scholar, and PsycINFO, PubMed, ProQuest, and EBSCOhost. The search was restricted to articles written since 2014 but included two before that date as they are seminal works.

Theoretical Framework

The NWLM illustrated in Figure 1 describes the interrelationship between five elements in the practice environment that have an influence on personal accomplishment, depersonalization (burn-out), and emotional exhaustion. These elements include "strong nursing leadership, RN-MD collaboration, policy involvement, staffing adequacy, and nursing model of care" (Ballard, Boyle, & Bott, 2015, p. 3). In the model, strong leadership is posited to be the point of origin, causing positive pathways to staffing adequacy, policy involvement, and collaboration between RNs and MDs. The nursing model of care, policy involvement, and collaboration between RNs and MDs, mediate the influence strong leadership has on personal accomplishment. Significantly, depersonalization and emotional exhaustion were indirectly influenced by strong leadership through staffing adequacy.

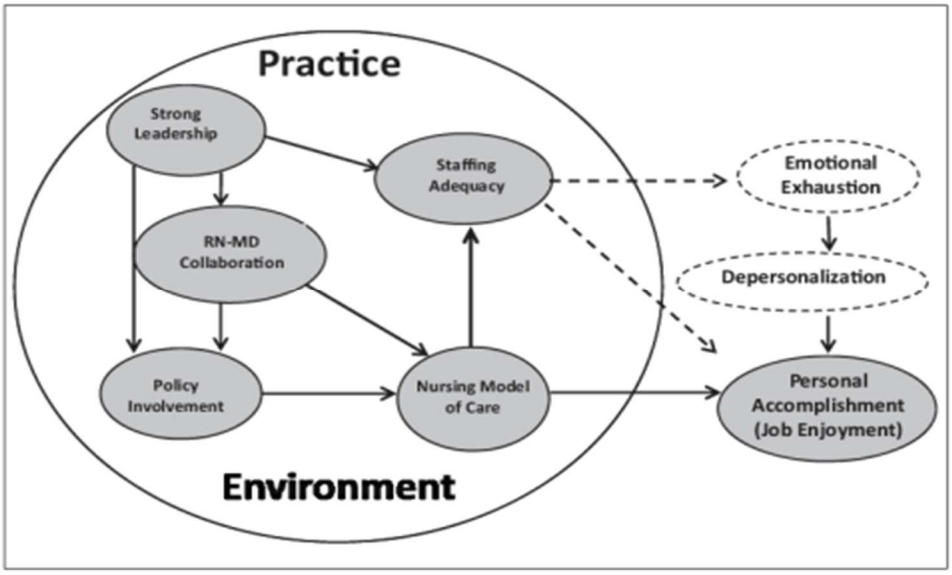

Figure 1. nursing work life model adapted from Ballard, Boyle, & Bott (2015, p. 3).

Leiter and Laschinger (2006) proposed the NWLM to indicate a pattern of relationships between various work-life areas. The model more fully formulates how nursing management can develop and establish work environments that promote professional practice by the nurses and ensures the delivery of high-quality care. Roche, Laschinger, and Duffield (2015) postulated that there is promising empirical support for the model evident in North American settings. However, the extent to which the model has been adopted and tested in other nations is relatively undocumented.

In the model, *nursing leadership* is defined as the skill to put together processes and resources that were necessary to deliver care, while the RN-MD collaboration indicates the importance of nurse/physician working relationships. Policy improvement, on the other hand, is the latitude nurses have in decision making, and the nursing model of care emphasized a preference for the nursing model instead of the medical model of care. Staffing adequacy is related to how nurses perceive if they have the necessary tools to provide care to patients. All these elements in the model are interrelated with the main purpose of allowing for a conducive practice environment that would affect emotional exhaustion and in effect, lead to a sense of nurse engagement in their duties.

The NWLM was tested by Ballard, Boyle, and Bott (2015). In their study, they analyzed secondary data obtained from the 2011 National Database for Nursing Quality Indicators (NDNQI) about 2,203 step-down and critical care units and medical-surgical units. The authors found positive pathways associated with the NWLM causal model, but other useful pathways were also determined through an iterative process. The ability of

nurse managers, support, and leadership were directly associated with job engagement and another critical part of the model. This suggested the importance of nurse manager development as an important tool for retaining clinical nurses.

It is important to appreciate and understand how the elements in the practice environment influence each other because interventions will then be possible to improve the practice environment and enhance job engagement among nurses. In the study above, nurses job engagement is directly influenced by nurse manager leadership, a critical finding that should be noted by hospital administrators and nurse managers. More importantly, elements that allow a good work environment to reduce burnout and thus enhance nurse engagement (Ballard et al., 2015).

The nursing sector is reported to have high rates of poor health within its ranks, dissatisfaction with work, burnout, and stress associated with the profession. As such, the psychosocial environment in this sector is important to grasp as a way to address the multiple demands of patients. In their study, Van Bogaert et al. (2017) examined two models related to the association between work characteristics and practice environment as mediators of engagement, burnout, quality of care and job outcome, and nurse workload from the point of view of nurse managers and nurses in two American acute care hospitals. The findings of this study confirmed that engagement and burnout were mediating outcome variables.

Additional analysis found that policy decisions and management made a significant influence on daily practice. Additionally, good relationships between nurses

and peers and nurse managers, and good RN-MD relationships also influenced daily nurse practice. Importantly, nurse confidence was strengthened by these positive relationships in the face of demands that often lead to poor mental health and burnout (Van Bogaert et al., 2017). The study also revealed protective and risk factors in relation to the quality of care and job outcomes. These included nurse decision latitude and social capital at the unit level. According to Van Bogaert et al. (20170, social capital is a protective factor that addresses emotional exhaustion and stimulates vigour and decision latitude is associated with personal dedication and accomplishment. Van Bogaert et al. (2017) posit the view that nurses who work in an empowered environment get opportunities for personal development and learning, and supportive relationships assist them in attaining their goals.

However, the workload was identified by Van Bogaert et al. (2017) as a risk factor because it negatively affected vigor and emotional exhaustion. The participants in the study were of the view that nurses could only handle a certain capacity of workload to address patients' emotional and physical needs, and as such there was workload which was acceptable and that which was perceived to be unacceptable. For instance, a prolonged workload resulted in fatigue and decreased efficacy and adequacy.

Studies about the NWLM model have been conducted using data collected and examined at the individual nurse level. The importance of the approach of utilizing unit data level was stressed by Gregory (2015), based on premises by previous researchers. The review by Gregory (2015) postulates that the premise by those studies was that

analysis of the NWLM at the unit level was essential to mirror the aggregate of the situations or circumstances on the work unit in which the practice occurs. The practice environment might vary between units leading to a lack of adequate attention to the units exhibiting poor outcomes if the data aggregated at the broad hospital level. The resolve of these studies was to highlight the suitability of the NWLM to unit level data. Additionally, this would allow the extension of the findings to incorporate a measured patient outcome (in this study, patient falls) at the hospital unit level (medical-surgical units).

Nurse Work Engagement

Institutions with high levels of employee engagement can retain their staff and satisfy their customers (Chapman, 2017). However, employee engagement is not prevalent. In the health profession, nurses caring for patients experience the highest levels of burnout and job dissatisfaction compared to nurses in other settings (McHugh et al., 2011). This is a serious matter because associations with patients in the hospital setting are critical for better health outcomes (Aiken, Smith & Lake, 1994). In the current health care environment, quality of care and excellent experiences are benchmark metrics for the delivery of patient care (Chapman, 2017). Given that nurses are central to patient outcomes, motivation on their moves is a key question. Career advancement programs may be an avenue for promoting engagement, but Chapman's (2017) survey of nurses in an academic center did not support such a hypothesis and it is thus vital for employers to

examine extraneous variables that affected nurse engagement. However, participation in such programs was found to improve patient outcomes.

Chapman (2017) posits the view that health care delivery changes have led to environments with numerous demands., making it essentials to examine the stressors nurses have to bear so it can be known how such stressors affect patient outcomes and the nurse engagement. Significantly, the concepts of absorption, dedication and vigor should be understood in relation to how they can enhance nurse engagement and at the same time curb work-related stress.

Burnout takes place in many professions, but the nursing environment is known to be highly stressful, more so than other occupations (Van der Colff & Rothmann, 2009). The work of nurses is challenging because they have to confront grief and suffering and death on many occasions. Despite such occupational stressors leading to ultimate burnout among nurses, the positive side of the profession is that many are immersed and dedicated to their work, a concept referred to as engagement (Schaufeli, Salanova, González-Roma & Bakker, 2002). Burnout, considered to be the opposite of work engagement, has a detrimental effect on the quality of care and should, therefore not be underestimated. Industrialized countries are experiencing rising rates of occupational stress, an issue whose evidence is seen in more absenteeism related to occupational stress (Van der Colff & Rothmann, 2009). Given such facts, it is important to identify job stressors and personality traits associated with engagement and burnout in the nursing profession.

In their study among registered nurses in South Africa, Van der Colff & Rothmann (2009) found that a lack of organizational support and work demands contributed to perceptions of depersonalization and erosion of emotional resources. Nurses with positive work engagement perceived themselves as capable of addressing work demands. They had energy and commitment. This is an important point as nurse engagement and burnout are related. In Van der Colff and Rothmann (2009) study, stressors such as the risk of disease through contact with patents, patients' demands, and excessive workloads, were identified. Others included watching the suffering of patients and conducting painful procedures.

Therefore, the well-being and stress among nurses are important indicators which point to the working conditions of nurses, the relationships they have with patients, among themselves and with their colleagues, and the level of care delivery they provide (Van Bogaert, van Heusden, Timmermans, & Frank, 2014). Nurses work in challenging environments that can compromise their ability to provide high-quality care. In their cross-sectional survey among 1201 registered acute care hospital nurses, Van Bogaert et al. (2014) examined the mechanisms through which dimensions in their practice environment such as organizational and management support, nurse management, and RN-MD relationships, are related to the quality of care and job outcomes.

Significantly, dimensions of work engagement including dedication and vigor, as well as work characteristics of decision latitude, social capital, and workload, were mediating variables. The dimensions in the nurses' practice environments predicted the

quality of care and job outcomes. Significantly, the dimensions of work engagement and work characteristics mediated between the practice environment and work outcomes. This latter finding is important because it illustrates that dimensions of nursing work engagement, such as dedication and vigor affect the quality of care (Van Bogaert et al., 2014).

Van Bogaert et al. (2014) concluded that dimensions of work engagement had an influence on the quality of care and job outcomes, but positive nurse management was associated with more social capital and decision latitude which in turn affected work engagement variables of vigor and dedication. In addition, vigor (a dimension of work engagement) was also positively affected by good relationships between RNs and MDs. In turn, vigor had an influence on dedication and job outcomes and indirectly improved quality of care.

Involvement of nurse in workplace decision-making, which is essentially engagement, has been acknowledged as positively influencing improved outcomes. Higher nurse perception of quality care, decreased levels of burnout, lower levels of patient mortality, and a heightened sense of personal accomplishment are some of the factors associated with nurse engagement (Jaafarpour and Khani, 2011). Further evidence indicates that participation of nurses in formal work structures positively affects perceived empowerment (Porter, Kolcaba, McNulty & Fitzpatrick, 2010). Furthermore, engagement positively influences the commitment of RNs to relate therapeutically with their patients. Overall, various studies postulate that interventions that involve

collaborations between management and clinical staff promote better RN outcomes (Jaafarpour and Khani, 2011; Porter, Kolcaba, McNulty & Fitzpatrick, 2010).

It is important to create a various balance goals, issues and concerns between nurse management, physicians, and upper echelon management with a view to engendering a positive practice environment with reasonable workloads and enough decision latitude for nurses (Van Bogaert et al., 2014). Besides, social capital in nursing teams is important. That means emphasizing positive interpersonal relationships. When these conditions are in place, work engagement is stimulated, leading to positive outcomes of care.

Patient Safety Outcomes

Laschinger and Leiter (2006) examined the Nursing Work-life Model linking nursing practice conditions to burnout and thereafter to patient safety outcomes. The instruments used in the study involving 8,597 Canadian nurses included the Practice Environment Scale of the Nursing Work Index to measure work-life and Maslach Burnout Inventory-Human Service Scale to measure burnout. Nurses also made a note of the frequency of adverse events among patients. The finding of this study supported the Nursing Work-life Model. Nursing leadership impacted the quality of work-life in relation to support for a positive RN-MD relationship, a nursing model of care as opposed to a medical model of care, staffing levels, and policy involvement. In addition, patient safety outcomes were directed affected by a nursing model of care as well as

emotional exhaustion. The study concluded that nursing leadership has a critical role to play in improving the work environment as a means of reducing nurse burnout.

According to Laschinger and Leiter (2006), the process of engagement/burnout plays a critical mediating role in patient safety outcomes. The findings of their study point to the importance nurses perceive a good work environment for improved professional practice and enhanced nurse engagement; all directly contributing to patient safety. However, the resultant safety of patients has its origins in strong nursing leadership in ensuring a good environment for work engagement. In essence, Laschinger and Leiter argued that adverse events are influenced by qualities of the workplace that directly affect personal accomplishment, depersonalization, and nurse exhaustion. Such qualities of the workplace have an impact on nurse engagement.

In their systematic review of 1120 studies, Stalpers, de Brouwer, Kaljouw and Schuurmans (2015) found several work environment characteristics that had a relationship with patient falls. Positive collaborative relationships between nurses and physicians, for example, resulted in a lower number of patient falls. In addition, higher levels of experience and education were associated with fewer patient falls.

Fall Risk Factors. Falls cause the most fatal and non-fatal injuries in people over 65 years of age (CDC, 2014). In 2014 alone, falls were numbering 29 million, over a third of whom needed medical treatment. Falls are common, thus pose a great burden to the health system. It is recommended that older adults are screened for risk of falls. As an incentive to prevent falls, the Hospital-Acquired Conditions (HACs) Initiative was

implemented by Medicare (Waters et al., 2015). This initiative aimed to block payment for what is termed "never events," or eight complications associated with hospital care. However, a study by Waters (2015) on the relationship between the initiative and four outcomes found that injurious fall trends did not reduce due to the policy. In fact, little evidence was found to suggest that better outcomes in this domain can be found by altering processes in hospitals (Waters et al., 2015).

The subject of fall events and nursing are closely intertwined. As Matarese et al. (2014) point out; clinical settings lack accurate screening tools for falls. In hospitals, nurses often implement fall preventive measures after an assessment of their patient. These assessments include regularly observing patients when on shift, or making requests to volunteers, nursing assistants, and family members to be of assistance with monitoring and observation. As such, a screening tool's sensitivity may be affected since high-risk individuals may not fall because effective fall preventative measures have been implemented. Similarly, a patient identified as low risk may experience fall events due to new medication or an episode of delirium that was not present during the process of screening at admission.

Matarese et al. (2014) argue that accurate fall screening tools are helpful, but cannot replace patient assessments conducted by nurses, especially in the older population. In essence, a fall risk screening tool used in combination with a clinical assessment may be the best path to use in identifying fall risk factors.

In their systematic review of screening tools for fall risk factors among older patients, Matarese et al. (2014) argued that falls were very common in older patients, but the few screening tools that are used to determine the risk of falling had not been validated in this population of patients. However, two fall risk screening tools have been tested in prospective validation studies in older patients. These include the St. Thomas Risk Assessment Tool in Falling elderly inpatients (STRATIFY) and the Hendrich fall risk Model II. However, none of these screening tools has adequate predictive accuracy (Matarese et al., 2014). Significantly, characteristics of nursing personnel, case-mix of patients, and measures for fall prevention can affect the accuracy of these screening tools.

According to Abraham (2016), research on inpatient falls among psychiatric patients are few compared to studies on community-dwelling and medical-surgical patients. Thus, in his literature review, he sought to identify intrinsic and extrinsic factors that were related to fall events in this neglected population. Abraham (2016) found that history of falls, unsteady gait, confusion, and numerous medications, were primarily responsible for fall events. However, 56 per cent of falls were attributed to intrinsic factors, while 44 percent of fall events were attributed to extrinsic factors.

In Abraham's (2016) literature review, he sought to identify intrinsic and extrinsic factors that were related to falls in psychiatric patients. Intrinsic factors associated with patient falls include multiple medications, sleeplessness, advanced age, incontinence, poor vision, cognitive status, a heart condition, unsteady gait, and weakness of muscles, pain, chronic or acute illness, and a history of falls. Extrinsic factors, on the other hand,

are external to an individual. They include poor implementation of fall prevention strategies, inadequate staffing levels, poor visibility or distance of patients from nurse-posts, neglect of patients, loose shoelaces and poor footwear, failure to use walking devices, clutter and obstacles, design of furniture and rooms, insecure floor mats, slippery surfaces, loose cables, and poor lighting.

Therefore, a fall prevention intervention plan should prioritize team communication, adequate supervision, and staff training. In addition, patient assessment and intervention should take cognizance of intrinsic and extrinsic factors, ensuring to be alert about necessary changes that have to make in the environment (Abraham, 2016). In his conclusion, Abraham argued that very few fall risk assessment tools are available to evaluate intrinsic and extrinsic reasons.

Hayakawa et al. (2014) posited the view that identifying people who need assistance with daily tasks, those with a history of fall events, and the elderly, was important because care plans could then be designed for such high-risk individuals. A clinical path could be used so that each inpatient schedule could be planned properly to prevent falls. Medical personnel should also be alert about a patient's present medications and history. An analysis of such information is important because Hayakawa et al. found that 26 percent of those with a history of falls experienced fall events compared to 8.3 percent who had a history of fall events but did not fall. Similarly, 9.1 percent of individuals with cognitive dysfunction experienced fall events compared to 2.3 percent of those with cognitive dysfunction but did not fall. In addition, the majority of those who

required assistance with daily tasks also experienced fall events, and also those who used a laxative, sedative, psychotropic, or hypnotic medication.

In their examination of clinical records in relation to risk factors for fall events at Japan's Fukushima Medical University Hospital, Hayakawa et al. (2014) found that 2.5 percent of patients who had been admitted subsequently experienced fall events, and such events occurred 3.28 times per 100 person-days. However, differences were found between patients who fell and those who did not fall in relation to assistance with routine activities, movement, and use of wheelchair, psychotropic or hypnotic medications, using of laxative, rehabilitation, planned surgery, cognitive impairment, history of fall events, and age. Need for assistance, history of fall events, and age were risk factors in both women and men. The risk factor for males was the use of psychotropic medication while in females, it was the use of hypnotic medication when cognitively impaired. However, planned surgery was not a high-risk factor for females.

In their integrative review of 71 articles about fall events in adult inpatients, Severo et al. (2014) concluded that fall screening was important to minimize falls because falls often cause death. Despite the prevalence of intrinsic factors associated with fall events, extrinsic factors contributed as well. Such extrinsic factors may be work processes including relationships between nurses and patients. In their view, Severo et al. posit the view that work processes receive little attention in research in relation to fall events.

Fall Prevention. Gu, Balcaen, Ni, Ampe, and Goffin (2016) evaluated fall prevention programs and concluded that an integrated program consisting of staff training, modification of the environment, and patient evaluations, can minimize fall events. These fall prevention programs can be implemented with little cost and as such, illustrates a good return on investment; the return being better patient outcomes. As Gu et al. observe, falls are an attractive problem that can be solved cheaply to improve quality of care and lower treatment costs. The benefits of fall prevention measures vary, but there are common themes found in those which are successful.

Firstly, a good program will deploy an assessment to determine high fall risk patients. Such an assessment can be conducted economically with instruments such as the STRATIFY scale for elderly individuals in a hospital environment or Morse fall that assesses patient diagnoses, history of falls, and need for assistance with movement (Gu et al., 2016). Secondly, the patient's care team should have good communication. Thirdly, there must be a safety culture encouraged and also improved continuously. Gu et al. (2016) point out that nurses have the most contact with patients and are therefore, critical in fall prevention. A viable fall prevention program must ensure that nurses receive proper training that enables them to conduct proper assessments of high-risk fall patients. Nurses must also be given allowed autonomy to put in place prevention measures and regularly conduct evaluations to determine the benefits.

It is not only frail and elderly patients who are at risk of fall events in hospital environments (The Joint Commission, 2015). Any patient is at risk of falling because of

diagnostic testing that has caused them to be confused or weak, medical procedures, surgery, medications, or physiological changes resulting from an illness. There are hundreds of thousands of falls in the U.S. each year, with approximately 30 percent leading to injury (Fischer, Krauss, Dunagan, Birge & Hitcho, 2005). Such injuries necessitate further treatment and often lengthier stays in the hospital. A fall causing injury is estimated to cost approximately $14,000 (Haines et al., 2013). The main contributors to falls with the injury include poor assessment, failures in communication, and inadequate fidelity to safety practices and protocols. Other factors include poor staff orientation and leadership, and problems in the physical environment (The Joint Commission, 2013).

Nursing Excellence.

New graduate nurses need acculturation if the shortage in their profession is to be addressed (Pfaff, Baxter, Jack & Ploeg, 2014). They face a stressful transition period since they are expected to perform with the same level of competence as the other health professionals in their workplace. One strategy is an interprofessional collaboration, a process of enabling smooth transition and retention (World Health Organization, 2010). In their analysis of research reports to understand facilitators and barriers of engagement of new graduate nurses in interprofessional collaboration, Pfaff et al. (2014) found several factors at the organizational, team, and individual level. These included respect and support, communication skills, experience, knowledge, and self-confidence. As such,

these factors should be understood by health professionals so that they can design strategies for the collaborative practice among new graduate nurses.

In addition to institutional orientation, pre-graduate orientation should focus on weaknesses that act as barriers to new graduate nurse experience and knowledge in relation to interprofessional collaboration (Pfaff et al., 2014). In essence, promoting interprofessional collaboration is a shared responsibility between the institutional and academic sectors. About the latter, it is recommended that new graduate nurses are provided opportunities for collaboration so that they can enhance their experience, knowledge, and self-confidence in interprofessional collaboration (Pfaff et al., 2014).

In addition, a secondary analysis of patients' views about their stay in Magnet hospitals, found them to view such hospitals highly, would recommend others to the hospital, and nurse communication stimulated good care experiences (Stimpfel, Sloane, McHugh & Aiken, 2016). Magnet recognition denoted nursing excellence and has often been associated with high-quality care experiences for patients. Improving patient experiences has now become the trend, particularly given initiatives of value-based purchasing (VBP) aimed at addressing increasing costs in health care. The purpose of VBP initiatives is to encourage more transparency and better health care by using prescribed metrics to either penalize or reward providers in relation to their performance (Millenson, 2013). An example is the VBP program under the Affordable Care Act, which reimburses hospitals according to how they have performed compared to their baseline (Stimpfel et al., 2016).

Quality improvement in health care has, therefore, put more attention on patient care experiences, resulting in an emphasis on patient-centered care (Stimpfel et al., 2016). One important focal point in patient-centered care is the registered nurse, and hospitals are increasingly concerned with adequate staffing, reasonable workload, and supportive environments at work (Aiken et al., 2012). Thus, elements of the Nursing Work-life Model are relevant in this regard since nurse staffing, training, and a good work environment are pathways to better patient outcomes. As Stimpfel et al. further point out, the Magnet recognition program is an important pathway for implementing better work environments for nurses. To achieve Magnet recognition, a hospital must demonstrate transformational leadership, excellence in professional practice, continuous improvement, use of best practices, and structural empowerment.

Moreover, a cross-sectional survey of 2241 nurses in U.S. hospitals by Wilson et al. (2015) found that nurses employed by hospitals designated as Pathways to Excellence or Magnet face fewer impediments to evidence-based practice than nurses in non-designated hospitals. This finding hence provides a case for institutions to put in place structural supports that avail opportunity for research and professional development of nurses so that they can contribute to their full potential.

Role of Nurses in Preventing Falls.

Nurse Certification. Nurses play a critical role in preventing falls but most research that has been conducted on patient falls has focused primarily on nurse staffing, giving little attention to an important characteristic of nursing such as RN national

nursing specialty certification rate and its relationship with patient falls (Boyle, Cramer, Potter & Staggs, 2015). Boyle et al. (2015) further posit the view that nursing certification rates have been on the increase and rates of falls have been on the decline, but these trends have never been given serious attention to determine if they are related or are merely a coincidence.

Boyle et al. (2015) analysis of longitudinal data from the National Database of Nursing Quality Indicators found support for strengthening national nursing specialty certification as a method of addressing patient falls. There was an inverse relationship between RN national nursing specialty certification rate at the unit level and rate of falls at the unit level from 2004-2010. These findings suggested that an increase in certification rates can reduce the number of falls over time, but it was unclear whether there was a direct relationship between certification rates and rate of falls because the research model was not causal. There may have been other improvement efforts that contributed to reduced falls.

However, if Boyle et al.'s (2015) findings are considered with other previous studies, the conclusion may be drawn that the increase in nurse certification rates has a direct relationship with reduced falls. In a study by Kendall-Gallagher and Blegen (2009), the percentage of certified registered nurses was inversely related to fall rates. Similarly, Boltz et al. (2013) found nurse certification to have an influence on the outcomes of older inpatients in 44 medical-surgical units serving older adults. These outcomes included reduced falls.

Boyle et al. (2015) argue that rate of nursing specialty certification may be associated with falls because certified nurses have more knowledge and awareness of the quality of care and patient safety, leading to better outcomes for patients. If this hypothesis is valid, the implication would be that content on quality and safety is integral to nursing specialty certification, even where evidence-based prevention strategies for specific adverse events are absent (Boyle et al., 2015). The content on quality and safety includes diffusion of innovation, conducting studies on quality improvement, benchmarking and keeping track of safety outcomes, and evaluating risk.

Collaboration. In another study, DuPree, Fritz-Campiz, and Musheno (2014) described a collaborative approach to fall prevention in health facilities. The Joint Commission Center for Transforming Health Care teamed with seven US hospitals in a project lasting eighteen months within selected inpatient units. Participant hospitals included New Hampshire's Wentworth-Douglass Hospital, North Carolina's Wake Forest Baptist Health, Baylor Health System and Memorial Hermann Health Care System in Texas, California's Kaiser Permanente, Minnesota's Fairview Health Services, and Missouri's Barnes-Jewish Hospital. In addition, each hospital utilized Lean-Six-Sigma based Robust Process Improvement (RPI) tools and methods to determine causes and design strategies for fall prevention.

The main objective of the project was to reduce falls with injury by 50 percent and a secondary objective was to reduce the fall rate by 25 percent (Dupree et al., 2014). The processes that were examined by the hospitals as they sought to understand what

caused falls with injury included handoff communication, change management and education, call light, chair and bed alarms, toileting/using bathrooms, medication, unassisted ambulation, fall risk assessment, and patient characteristics.

In a collaboration between the hospitals and the Joint Commission Center for Transforming Health Care, causes were found, and solutions developed to address falls (Dupree et al., 2014). In the process, it was discovered that fall prevention was not a set of unrelated and disparate activities but a comprehensive approach using targeted strategies aimed at reducing harm to patients. Strategies to minimize falls with injury included patient partnering, hourly rounding, using valid fall assessment methods, engaging families and patients, adopting a safety culture, and enhancing patient-caregiver relationships.

There were several lessons learned. A comprehensive approach that included clinical and non-clinical staff, as well as leadership, was essential (Dupree et al., 2014). Another important finding was that partnering with families and patients in the process of fall safety during admission was vital. More importantly, the project determined that nurses play a central role in patient safety endeavors and they were important in reducing falls with injury among patients. In addition, the bedside nurse played a gatekeeper role for the family and patient. As such, such a nurse was responsible for patient safety. In general, Dupree et al. (2014) posit the view that nurses empower families and patients through education and communication.

Colon-Emeric et al. (2013) hypothesized that a combination of a staff intervention that aimed to improve problem-solving, communication, and connections (CONNECT) would enhance the outcomes of a falls intervention education program (FALLS). The control group among the nursing home staff went through the FALLS intervention only, while the intervention group took part in the CONNECT program followed thereafter by the FALLS intervention. Despite evidence of perceived improvements within the intervention group in relation to the quality of providing care, the climate of safety, more engagement in decision making, and better communication in their ranks, the rate of falls did not significantly reduce in facilities under their supervision. In the control group, the fall rates did not reduce at all. Colon-Emeric et al. (2013) argued that while CONNECT could improve the delivery of care, a larger study would be required to determine the effect on the rate of falls through CONNECT in combination with the FALLS intervention.

Collaboration in falls prevention is therefore important because it reveals weaknesses in certain approaches. In Dupree et al.'s (2016) study, for example, a partnership with stakeholders such as families is essential. However, as the study by Colon-Emeric et al. (2013) found, larger studies are essential to determine the effects of collaboration in conjunction with a falls prevention program.

Intentional Rounding and Human Behavior. Intentional rounding is described as conducting routine checks on patients by nurses at defined intervals, instead of acting in response to a call bell (Harrington et al., 2013). Through intentional rounding, patients

become central to ward routine. According to Fitzsimons, Bartley, Cornwell (2011), patients experience better health outcomes when they spend more time with nurses. The round starts with nurses introducing themselves and stating the purpose of their presence, the aim is to generate trust and confidence in patients. The nurse then conducts scheduled observations or tasks with the patients. At this point, the nurse attends to the comfort of the patient, assesses any environmental risk to the safety of the patients, and also attends to pain, toileting and positioning needs of the patients (Fitzsimons, et al., 2011).

Intentional rounding has been shown to have benefits. For example, Harrington et al. (2013) study on intentional rounding found increased patient satisfaction, no recognizable threat to the safety of patients, and reduced interventions through summons by call bells.Blakley, Kroth and Gregson (2011) study in a community hospital found that intentional rounding reduced patient falls. The study by Harrington et al. (2013) also brought to the fore the relevance of a shift coordinator, in this particular case a Registered Nurse. The shift coordinator oversaw cognitively impaired patients by effectively coordinating staff in an environment of intentional rounding. Harrington et al. recommended that a specialist ward or surgical ward could first conduct a trial of intentional rounding simultaneously with intentional rounding in a medical ward to know if the intentional rounding was influenced by patient dynamics in certain wards. In addition, a team nursing model could be considered when implementing intentional rounding.

However, Human Factors & Ergonomics is also an important consideration. A primary challenge of Human Factors & Ergonomics systems within the health setting is the twin human interface; the people driven (nurses) and patient-centered (patient) (Hignett & Wolf, 2016). A Similar challenge is evident in other settings, such as public transportation where multiple individuals collaborate to attain a common objective to reach a destination in an environment where the journey for passengers is temporal. A partnership, therefore, exists between the driver and passengers. On the one hand, passengers should take their seats and remain seated while the driver embarks on the journey when all passengers are seated safely; a process referred to as goal confluence. While goal confluence in the transportation sector is predictable, the same cannot be said about the health setting.

Passengers in a queue will wait for patiently as expected until their turn to be seated, but nurses and patients in the health setting will often have conflicting goals in relation to independence and mobility (Hignett & Wolf, 2016). In such a situation, the objectives of fall interventions can be jeopardized. An example is toileting, an activity that patients would like to exert their independence and desist from asking for assistance. As such, bedside safety to prevent falls should take into consideration the perspective of patients so that they can have more independence of movement. An example is a bed side walker table. Hignett and Wolf (2016) thus argue in favor of appreciating the Human Factors & Ergonomics systems approach to fall prevention. Such an approach takes into consideration human behavior. Human Factors & Ergonomics is critical, but intentional

rounding is similarly essential because it allows nurses to check on the needs of patients frequently.

Staff Training

Education. There are many factors that cause differences in knowledge about best practices for fall prevention. These factors include differences in training and turnover of staff (Gantz et al., 2013). Such gaps can be overcome with education, albeit first making an effort to determine the gaps through an evaluation of staff knowledge. However, such an evaluation of training and knowledge to enhance expertise is insufficient. It is vital to incorporate training into ongoing work routines.

Several fall prevention activities have been seen in some hospitals. In a Geri-psych unit, patients are kept in sight, and rounding conducted every fifteen minutes (Gantz et al., 2013). In addition, there is the education of staff on fall prevention annually. In a medical unit, an assessment of mobility deficit is conducted by nurses, and patient sitters are used to keeping an eye on patients with a history of falls. Nurse stations are close by, and pharmacists scrutinize medication profiles. In a neurology unit, nurses play a central role with the assistance of physicians to determine medications that could alter the fall-risk status of a patient.

Patient falls are therefore a significant problem in hospitals and fall prevention efforts must of necessity use a system approach that attains organizational change through various changes occurring at the same time, affecting decision making, communication, and workflow (Ganz et al., 2013). This kind of organizational change is

a challenge to actualize, requiring that the organizational readiness for change is assessed to avoid implementation difficulties. Members of the organization should understand why change is required, and it should be determined if the need for change is urgent. Also, senior leadership should support the change effort. Moreover, resources to implement change will need to be determined. It is important to answer these questions for several reasons. For instance, senior leadership may believe fall prevention is critical, but there may be a high turnover in their ranks and nurse leadership. Additionally, there may be competing priorities for scant resources.

Sustained change stands a high chance of success of fall prevention influencers have common motivation and knowledge (Gantz et al., 2013). While the individuals initiating fall prevention may understand why change is required, the motivation and knowledge to change may be dissimilar in the organization. Positions and issues held by various people must thus be addressed at the onset. Furthermore, to change attitudes and update knowledge among clinical personnel needs information sharing as well as addressing existing attitudes and knowledge that can be barriers to fall prevention efforts. This is critical since fall prevention is a responsibility that crosses disciplines.

An evaluation of the 6-PACK program provides a glimpse into the importance of nurses in fall prevention efforts. The program is multi-factorial and led by nurses in acute care environments (Barker et al., 2016). The program is based on best practices and has a tool for fall risk assessment and six interventions. The interventions are: Alert signs for falls, bathroom supervision, ensuring walking aids are within reach, a schedule for

toileting, and use of chair/bed alarm and low-low bed. In an evaluation of the 6-PACK program on falls and fall injuries in 24 acute wards in six Australian hospitals, Barker et al. (2016) found no evidence of reduced falls between control and intervention groups, but the program caused positive changes in practices of fall prevention. As such, Barker et al. concluded that acute wards fall prevention efforts did not have high-quality evidence of success.

However, a previous study by Barker, Kamar, Morton and Berlowitz (2009) found that falls had reduced after implementing the 6-PACK program in an acute hospital. The program may have succeeded in reducing fall injuries in this study because its implementation did not depend on multidisciplinary intervention (Barker et al., 2016). Barker et al. (2015) observe that nurses are the frontline caregivers, so they are best positioned for activities concerning fall prevention. In contrast, the 6-PACK program examined by Barker et al. (2016) was implemented through the support of project change management, program facilitators, and an implementation guide. There was a clinical leader, ward champions to conduct audits, train members of staff, and provide reminders and feedback about the program.

The importance of staff education on fall prevention was captured in a study by Hill et al. (2016). The purpose of this study was to examine the efficacy of individualized education on fall prevention delivered at the ward level in eight rehabilitation hospital units. There was a focus on providing patients with individualized education by a health professional. Their goals and opinions in relation to the ward environment as well as

what they perceived as obstacles to participating in fall prevention efforts, were noted by staff.

However, there was also a component of staff education which entailed training before the intervention (Hill et al., 2016). Staff was acquainted with details about the program so that they could after that be able to educate patients. Weekly feedback provided by patients was shared with groups of staff and individuals. In this way, patients' goals were understood, and the obstacles they thought stood in their way of participating in the fall prevention efforts. An example of feedback could be a patient reporting that a mobility aid was out of reach. This would then alert nurses to place the aid within reach.

In Hill et al. (2016) study, the number of falls and injurious falls reduced after implementation of individualized staff and patient education. In fact, the number of falls also reduced among the cognitively impaired, albeit not as much as in those with better cognition. This illustrates that the intervention delivered at the ward level also benefited patients who had not undergone training. In essence, the intervention had over time shown evidence of increasing benefit that could primarily be attributed to the flourishing culture of safety that buttressed the education program for patients. It could also be attributed to the incremental changes in routine practices of care that were caused by feedback from patients (Hill et al., 2016).

Poor Reporting

However, a systematic review of inpatient fall prevention studies in U.S. acute care hospitals by Hempel et al. (2013) emphasized the importance of reporting outcomes if intervention approaches were to improve. After analysis of fifty-nine studies that met the criteria for inclusion, most did not provide adequate documentation of implementation strategies and 17 percent did not provide any documentation. The majority of interventions had multiple elements, such as risk assessments, post-fall evaluations, bed-exit alarms, care rounds, education for patients, and visual alerts for risks. However, risk assessments were usually not validated. In addition, half of the studies did not document if fall prevention strategies had been used with the comparison group, and less than 50per cent of the studies gave any historical data that could be used for purposes of comparison.

Hempel et al. (2013) observed that there might be interventions that are promising, but there needs to be better documentation of information about comparison groups, the components of the intervention, the fidelity of the intervention, information on implementation, and outcomes. In their systematic review of studies on fall prevention, Evans, Hodgkinson, Lambert, Wood, and Kowanko (1998) observed that the usefulness of published evaluations was constrained due to quality of studies, research design, and small sample sizes. Hempel et al. (2013) described the studies under their review as even more fundamentally flawed since data was inadequately described to provide enough utility for evaluation of effects.

Nurse Practice Environment

An underlying theme in understanding the NWLM is that of the nurse practice environment. Evidence in support of the association of both patient outcomes and the nurse practice environment, along with the influence of nurse leadership on a nurse's practice environment has been growing. For instance, Aiken et al., (2002) described the effect of nurse-patient ratios on the mortality of post-surgical patients. The study found out that an increase in the ratio that exceeded four patients for every nurse was linked with a heightened risk of mortality in 30 days. Other associated observations included heightened chances of failure to rescue, job dissatisfaction, and burnout (Needleman et al., 2002). Aiken et al. (2002) established a link between increased nurse hours per patient or fewer patients for every nurse, and improved outcomes for medical conditions like urinary tract infections and surgical conditions like failure to rescue.

Further studies have been conducted in relation to nurse practice environment and patient outcomes. A study by Kalisch, Tschannen and Lee (2012) determined a link between missed nursing care, including turning, teaching and ambulation, with increased fall rates in hospital units that had lower nurse staffing levels. The results suggested a high patient-to-nurse ratio. Similarly, Needleman et al. (2002) arrived at the conclusion that better outcomes were associated with greater nurse staffing levels, an observation that implied lower nurse-to-patient ratios had better outcomes for surgical and medical conditions like failure to rescue and urinary tract infections respectively.

The inclusion of the nurse-sensitive measures concerning practice environment has been endorsed by various medical organizations and institutions across the country, a factor that further illustrates the validity and reliability of the choice of NWLM to establish nurse engagement and patient falls in the medical-surgical units in Unites States health care facilities. Some of the organizations that have endorsed the measures include Agency for Healthcare Research and Quality (AHRQ), The Joint Commission (TJC), Centers for Medicare and Medicaid Services (CMS), and the National Quality Forum (NQF) (Kalisch, Tschannen & Lee, 2012). The endorsements provide a broad validation and recognition of the essence of the practice environment and its association with RN quality care delivery. Furthermore, the study by Aiken et al. (2011) reinforces the assumption that offering good care is not exclusively related to the population of patients assigned to a particular nurse. Analysis of particular aspects of the practice environment at the constricted unit level and the potential link with particular nurse-sensitive quality signals like falls will contribute to the body of knowledge that has been collected over the years utilizing hospital-level data. Since practice environments might vary between similar different units in a institution due to previously identified factors, then it is essential to examine the connection of outcomes at a particular unit level as sought by this study.

Federal and State Regulations on Falls

Patient safety became an important issue when the health care system underwent a profound change, from one which was clinician-based to a system of many stakeholders

and numerous layers of negotiated care (Weinberg, Hilborne & Nguyen, 2005). In the recent past, state legislatures have assumed some of the responsibility of regulating health care. In the process, the boundaries between state and federal legislation have been tested. Examples include legislation on employee benefits, tort reform, and addressing abuses in managed care. This pattern has also been seen in the efforts states have made to regulate the safety of patients, in the process starting a discourse on the characteristics of patient safety interventions. As a consequence, there has been a proliferation of state legislations on reporting.

The change in the health system should have prompted the Federal government to revisit regulatory mechanisms, but legislation at the national level has dwindled. In the 1999 Institute of Medicine (IOM) report, a systems-based approach was proposed as a method to enhance the safety of patients, prevent errors, and to encourage disclosure instead of blame. Many patient safety quasi-re4gulatory approaches should be re-examined to establish the definition of error in medicine since it is obscure what most mean to patients and their families. In other words, should the absence of a calamitous event such as a fall be described as "safety", and whose point of view should describe an adverse event, is it the patient, the health plan, or the physician? Weinberg et al. (2005) argue that state legislation is best placed to address this issue, in the process preserving the views of the consumer. This section therefore focuses on regulations and policies of falls, at the federal and at the state level.

Medicare. The health care for older adult is primarily paid for by Medicare (American Occupational Therapy Association [AOTA], 2010). In addition, Medicare policy has the most influence on health services that address falls. Since Medicare is a regulator and a payer, its policy can prohibit, incentivize, permit, or require action to be taken by providers in relation to falls. Other state and federal policies such as Medicaid can also influence areas such as research, community program accessibility, and coordination of care.

Medicare coverage policy has a concept termed "medical necessity", described as services or items that may be required to diagnose or treat injury or illness or to enhance the functioning of a body member that is dysfunctional (AOTA, 2010). This is an important concept to note since activities related to prevention are not considered "medical necessity" and Medicare will cover such activities only when expressly stated by law, thereby causing tension between Medicare coverage and prevention efforts.

Unfortunately, beneficiaries are not made aware of Medicare's policy in relation to falls (AOTA, 2010). While it is a requirement that an assessment for falls risk is included in the Initial Preventative Physical Exam, this benefit is never given in communications to beneficiaries. In addition, communication in relation to health assessment and preventive service can be of assistance if it is mentioned that falls can be prevented through a health provider.

Quality Initiatives. Home health agencies and skilled nursing facilities (SNFs) supported by Centers for Medicare and Medicaid Services have integrated falls

monitoring into federally mandated assessment and data collection efforts (AOTA, 2010). Recent revisions in the mandated collection and assessment advocate for falls risk assessment as well as intervention plans to minimize falls risk. Significantly, a lot of rich data can be obtained from SNFs on falls risk and prevention to supplement that which is available from current research, but the mandated tool for data collection has a wide array of risk factors that care teams should consider. As a result, identifying relevant risk factors is obscured.

Coordination of Falls Care Among Providers. Scant coordination occurs among providers in relation to fall prevention. In fact, referrals and prescriptions are often regarded as coordination (AOTA, 2010). Coordination is also challenging due to regulatory mandates or the different criteria for coverage in various settings. For instance, referrals for falls treatment follow-up and after care initiated by emergency care providers may need such care to be provided by a person's primary or individual physician. While beneficiaries may want care to be provided in their homes, they should be "homebound" to qualify for home health benefit, a separate provision in Medicare. While Part B services under Medicare are allowed in the home of the beneficiary, most providers do not grant such provision. As such, after-care for fall patients may be insufficient and poorly coordinated.

State Regulations and Policies. There are a number of methods that can be deployed to reduce falls. First, primary care providers can be incentivized to incorporate falls risks assessment and prevention practices into their processes, and medical

education courses that provide skills to health care providers on falls risk assessment, reduction, and prevention can be supported (National Conference of State Legislatures [NCSL], 2017). Second, modifications in the home which minimize falls risk should be supported. Third, medication management that prevents falls should be facilitated. However, states have also developed legislation to address falls.

In California, protocols addressing prevention of falls must be developed by the department of health services as stipulated in the state's Osteoporosis Prevention and Education Act (NCSL, 2017). In addition, the state is expected to recognize and support the "aging in place" concept whose objective is to keep older adults safe from falls in their homes through suitable modifications. The statute mandating "aging in place" is the California Welfare and Institutions Code 9450. While most states have similar or more detailed legislation, it is mainly focused on support for prevention programs and/or policies. However, legislation in Connecticut, Minnesota, and Washington, goes further.

In Connecticut, General Statute 17b-33 requires the department of social services to put in place a fall prevention program, whose mandate is to conduct research, establish a fall prevention education program for health providers, health professionals, and physicians, who provide the elderly with care (NCSL, 2017). Through the statute, grants can be awarded to institutions to craft, implement, and assess fall prevention strategies in institutional or other settings. Under Chapter 108 of Minnesota Laws, there are specifications for competency assessments of unlicensed personnel, as well as specifications for training content and instructors in relation to falls prevention. In

Washington, section 74.39A.074 stipulates that long-term care personnel must complete a total of seventy hours basic training in fall prevention.

Summary

This section has gone to some length to describe the central role played by nurses in the prevention of falls in the inpatient setting. The literature review has analyzed this issue within the framework of the Nursing Work-life Model whose five elements in the practice environment have an impact on a nurse's personal accomplishment, depersonalization (burn-out), and emotional exhaustion.

Effective linkages between the five elements in the Nursing Work-life model result on positive nurse engagement. To buttress this argument and document the critical role of nurses in fall prevention efforts, the literature review analyzed patient safety outcomes in relation to the Nursing Work-life Model as well as fall risk factors and prevention strategies. For example, Hayakawa et al. (2014) argued that fall-risk assessments are crucial, especially since high-risk candidates can be identified at this initial stage. During admission, crucial data that gives an idea about the patient includes the following: the patient's age, fall history, and whether the patient needs assistance with daily tasks (ADL). Hayakawa et al. (2014) posited the view that this is the most critical information. In addition, plans for care should feature fall prevention, and treatment with hypnotic and psychotropic medicine should thereafter involve strict surveillance of patients. Nurse engagement is very important in this process.

The literature review would have been incomplete without briefly describing Federal and State regulations on falls, a subject that is enumerated at some length at the end of this section. In essence, this chapter has provided an appreciation of the numerous issues surrounding nurse engagement and its relationship to fall prevention in the inpatient setting.

Originality of the Study

Prevention of patient falls is an essential element in improvement of nursing effectiveness and better patient outcomes. Consequently, this study chose to utilize a model with the capacity to understand and improve various aspects of nursing practice. The NWLM is applicable to other aspects of nurses' work lives and engagement, besides issues like burnout, job satisfaction, and personal accomplishment. For instance, self-efficacy and work effectiveness for nursing practice are possibly two major outcomes of nurses' work lives that might result in empowered and engaged nurses developing the capacity to access the reviewed five practice domains.

Utilization of the nursing model of care boosts the influence of various aspects of nurses working environment, including resource adequacy and leadership on staffing, which in turn translates to outcomes. The following study seeks to extend the model in understanding how patient falls can be reduced through increased nurse engagement. Additional research with respect has been required for some time. Roche, Laschinger and Duffield (2015) observe that comprehensive research has been conducted that links work environment attributes to nurses' job engagement, satisfaction, and overall outcomes.

Other general studies have been conducted to determine various strategies that can be used to address patient fall in clinical settings. For instance, a review by Avanecean, Calliste, Contreras, Lim and Fitzpatrick (2017) examined various implementation strategies with a focus on fall prevention in hospitalized patients. However, there have been inconsistencies in research literature concerning multifactorial implementation strategies and best practices. In the literature, fall prevention, causes and prevention has been stratified to particular target populations such as patients and clinical nursing staff. Environmental risks in the acute care settings have also been associated with increased risk of fall (Avanecean et al., 2017). Several studies have examined the effectiveness of specially design care rooms for patients, hourly checks, safety alarms and flooring, low beds, and skid-proof socks, among others. Despite the incorporation of various combinations of factors in determining patient falls, no particular approach has been embraced universally. Examination of the various revealed that most institutions tend to create and establish their assessment tools, investigated in those organizations alone, and thus, they have not been independently evaluated for validity and hence, reliability.

The following study seeks to offer some additional unique contributions to the literature on patients' falls, with a unique focus on nurse engagement. First, the study utilizes the NWLM to determine essential factors that influence the performance of nurses. The research results more fully identify how particular features of professional practice environments interrelate and influence or predict nurses' job engagement and

satisfaction. Additionally, the NWLM is based on data sampled from American registered nurses. Ultimately, the study will contribute to fill the gap on the significance and how nurse engagement contributes towards incidences of falls in medical-surgical units in the United States.

Chapter 3: Research Method

Introduction

In this research project, I aimed to discover whether there is a statistically significant relationship between the engagement of nurses and patient falls. The results of this study could bring new knowledge to this topic and aid to curb fall occurrences. In this chapter, I will discuss the foundation on how this research was carried out in terms of the research design, methodology, sampling procedure, threats to validity and reliability, and ethical consideration. In this chapter, I aim to provide a critical and exclusive mechanism which can be used to unearth some of the fundamental aspects that aid in analyzing the correlation between the engagement of nurses and patient falls.

This retrospective correlational and MANOVA study analyzed the impact of nurse engagement on the frequency of falls in adult medical surgical patients. According to Child et al. (2012), the establishment of the contributing factors and coming up with sound suggestions to handle the case can be perceived as a fundamental step in the overall process of nursing care. In reviewing the literature, it is evident work has been done to look at fundamental aspects that relate to the nurses' engagement and the relationship to patient falls. The results of this study could contribute to the existing literature and add new information on the contributing factors for falls in this specific population. The results of this study could be used by hospital leadership to determine the best approach for fall prevention efforts. Reducing falls equates to better quality of care that increases patient satisfaction and increases revenue.

Research Design

In this retrospective study I analyzed clinical findings on patient falls from the NDNQI database. This database allows scholars in the health care sector to review and evaluate nursing performance against patient outcomes. Thereafter, they use the information to set organizational goals aimed at improving service delivery, which leads to enhanced patient care and the work environment (Stevens, 2013). This was also longitudinal because it involved retrieving the previous scholarly works documented over an extended duration, between QI and Q2, 2018 focusing on the NDNQI data. Moreover, it was nonexperimental as I did not rely on primary field data, but rather a secondary analysis of data submitted to the NDNQI database without reporting the means per NDNQI guidelines. A comparative analysis was conducted to establish the resultant falls, the severity of injuries, and the causative nursing factors across Q1 and Q2.

Variables

During falls, individuals or objects move from an elevated position to a lower level, usually in an uncontrolled manner. Likewise, the NDNQI website defines falls as unplanned patient descent to the floor, irrespective of whether injuries occur (Capezuti, 2008). The study was comprised of both dependent and the independent variables. According to Rees (2016), the former includes the controlled or changing phenomenon in a scientific study. On the contrary, the latter encompasses the experimental factors to measured as a result of altering the dependent variable. For instance, modifying the nurses' behaviors will result in observable changes in the number of reported fall cases.

The dependent variables for the study included data on patient falls. The three dependent variables identified for this study were Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted patient Falls, thereby differentiating between non-injurious falls, and injurious falls. Subsequently, the analysis depended on whether the effects of falls were minor, moderate, major, or result in death based on the patient's fall history, gender, age, or physical and physiological impairments. On the contrary, the independent variables examined was the nursing staff. Level of education, certification, work experience, and their respective hours per patient day (HPPD) were analyzed. For the MANOVA, Q1 data on RN Engagement variables were examined and a bivariate analysis revealed three critical IVs – Consulting with RN Nursing Administrators, RN Freedom to Adjust Practice, and RN Forced to Come to Work. Both the male and female nursing individuals were included in the study, while the educational aspect explored the relative number of nurses holding a bachelor's degree in the field. Regarding the nurses' experience, I investigated the relative duration they have served in a health care setting.

Sample Size

The process of determining the appropriate sample size for a quantitative study similar to this one can be tedious. Most scholars overcome this challenge by considering three types of variables associated with a significant level, power, and effect size (Goodwin & Goodwin, 2016). For each multivariate test, the observed power, effect size and significance level were assessed through SPSS. Furthermore, the sample comprises

all 13 facilities with a total of 38 units in scope (N=38) from the NDNQI RN Engagement and Practice Environment Survey 2018, to ensure the data holds value for the researcher. The researcher has complied with the Press-Ganey regulations for adhering to certain practices, while reporting the research, as well.

Once the values were obtained, I referred to existing statistician manuals and online calculators to compute the sample size. I relied on the G* Power program to determine the sample size (See Appendices A, B and C). Firstly, an alpha value or level of significant p= 0.05 was adopted, which implies that the likelihood of the results being established by chance will be 5% or in most cases will be 95% are statistically relevant to the study. Secondly, a statistical power of 0.8, which is common in quantitative studies, was used. The implied knowledge is that the research outcomes can reveal a difference between the control and the experimental population to an accuracy of 80%. Thirdly, I estimated that an effect size of more than 0.5 will be appropriate for clinical research. Accordingly, the discrepancy arising from manipulation would be justified by about 50% of a computed standard deviation in the study.

Threats to Validity

In preparation of the proposed study, I was pre-informed that there are substantial limitations associated with non-experimental longitudinal studies. One such drawback identified by Turner (2014) is that individuals relying on these data sources have no control over the independent variables, yet they directly impact the outcomes of the variables. Among the numerous factors that I acknowledge could affect the nature of

variables include precedent differences. Thusly stated, the study could fail to support causal inferences related to patient or nurse behaviors and attitudes because they are intertwined in a complex manner (Corno & Anderman, 2015). For instance, if the respondents were dishonest while participating in the original survey, then their feedback will severely affect the forthcoming study. Moreover, the data submitted by the various hospitals for the NDNQI database might not reflect the situation in other health care organizations, not only in the United States but also in the rest of the world.

Data Analysis

Descriptive statistics were used to summarize the data. Gravetter and Forzano (2018) reveal that the method involves describing the basic attributes of the dataset used in research to create a simple summary of the population and the measures. Moreover, it can potentially illuminate the relationship between variables. Initially, data retrieved was coded into specific themes as Excel 2007 files, before being imported to the SPSS program for statistical analysis. To investigate the staffing pattern more deeply, I explored the HPPD for each nursing employee. Additionally, I considered the bivariate relationship between their respective variables (gender, level of education, certification and work experience) against the reported patient falls. The variables determined to be statistically relevant were evaluated as independent variables in multivariate regression techniques. Other statistical investigations centered on frequency distribution, percentages, and standard deviations.

Ethical Procedures

Scholars in the health care sector must adhere to a specific regulatory framework that emphasizes on the consent processes and ethical behaviors when involved in research work. In this context, Natarajan (2017) notes that a significant number of professionals in the nursing field tend to erroneously use the terms “Code of ethics” and “Code of conduct” interchangeably. To distinguish between the two, he notes that the former is concerned with decision-making, while the latter dwells on ways in which organizations self-regulate themselves. The code of ethics emphasizes one treating others as would expect to be treated. It is prominently applicable in stressing the need for researchers to maintain confidentiality when handling sensitive respondent data such as ailments that could result in stigma when divulged to the public. Concerning my study, the archived patient, hospital, and nurse data was already coded, and therefore difficult to link or associate it with the original respondent. Chances of violating individual rights during the study are significantly low due to the reliance on data that is available for public scrutiny.

The code of conduct typically lists specific laws in the industry or with organizational procedures that individuals should adhere to, failure to which might attract penalties. Nursing scholars who adhere to these norms promote such desirable attributes as honesty and avoidance of error in research, which often emanate from fabricating, falsifying, and misreporting of research data (Jeffrey, 2014). In compliance with this expectation, the followed the guidelines set forth by NDNQI when using data in their

database, the mean was not reported. I simply stated whether the item was above or below the mean.

Summary

Analyzing the relationship of nursing engagement and patient falls in medical surgical units of hospitals used a quantitative design assessing secondary data retrieved for the NDNQI database. SPSS was used to conduct the statistical equations on the association between patient falls and nurse engagement.

Chapter 4: Results

Introduction

The purpose of this retrospective study was to examine the relationship between RN engagement and patient falls, indicating whether the extent to which nurses are engaged impacts the adverse patient outcomes in hospital units. Patient adverse outcomes have been conceptualized in terms of the Total Patient Falls Per 1000 Patient Days for Q1-2018 and Q2-2018, the Injury Falls Per 1000 Patient Days for the two quarters, and Number of Unassisted Patient Falls for Q1 and Q2. The research aims and objectives are associated with assessing and determining the nature and the direction of the relationship between patient adverse outcomes in terms of fall and fall related injuries and mortalities, and various aspects of RN engagement including autonomy, job enjoyment, professional development access and education/certification levels of the resident nurse.

The retrospective longitudinal research aimed to uncover the relationship between RN engagement and patient falls or injury outcomes. The study utilized existing data from NDNQI 2018, Q1 and Q2, to evaluate RN Satisfaction, Engagement and associated nursing quality measures and indicators. My research study bases its findings and conclusions on data associated with a health care institution with an emphasis on medical and surgical units, headquartered in the Midwest. There were 13 participating facilities and associated units (N=38) for QI and Q2 individually. The value of this study lies in creating an in-depth basis and evaluation of how and whether RN engagement and satisfaction impacts nursing outcomes and patient adversities.

Research Aims

- The detailed research aim and objectives of this study are presented below:
- Describe nurse engagement at facility and unit levels.
- Describe fall/injury outcomes at facility and unit levels.
- Describe theory-based factors that influence fall/injury outcomes at facility and unit levels.
- Evaluate if variations in nursing engagement as suggested by theory have an impact on patient/fall injury outcomes at facility and unit levels.

Research Questions

RQ1: Is there a significant variance between the groups with respect Consultation of Nursing Administrators by RNs in units and facilities under study for Q1 and Patient Falls Per 1000 Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls?

H_o1: There is no statistically significant variance between the means of the groups on Consultation of Nursing Administrators in the facilities studied for Q1, 2018 and Patient Falls Per 1000 Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls.

H_a1: There is a statistically significant variance between the means of groups on Consulting of Nursing Administrators in the facilities and units under study for Q1, 2018, and Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

RQ2: Is there a significant variance between groups on RNs Forced to Come to Work in facilities and units under study for Q1 and Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls?

H_o2: There is no statistically significant variance between means of groups on RNs Forced to Come to Work in facilities and units under study for Q1, and Total Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

H_a2: There is a statistically significant variance between means of the groups on RNs Forced to Come to Work in facilities and units under study for Q1, and Total Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

RQ3: Is there a significant variance between groups on RN Freedom to Adjust Practice in units and facilities under study in Q1, and Number of Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls?

H_o3: There is no statistically significant variance between group means on RN Freedom to Adjust Practice in units and facilities under study in Q1, and Number of Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls.

H_a3: There is a statistically significant variance between group means on RN Freedom to Adjust Practice in units and facilities under study in Q1 Number of

Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls.

RQ4: Is there a significant relationship between education, HPPD and certification in Q1-Q2 and impact on patient/fall outcomes in Q1-Q2?

H_o4: There is no statistically significant variance between RN Education and Certification and Total RN Nursing Hours Per Patient Day in Q1-Q2 and each of 3 patient fall/injury outcomes namely Patient Falls Per 1000 Patient Days, Patient Injury Falls Per 1000 Patient Days and Unassisted Patient Falls.

H_a4: There is a statistically significant variance between RN Education, Certification, Total RN Nursing Hours Per Patient Day in Q1Q2 and each of 3 patient fall/injury outcomes namely Patient Falls Per 1000 Patient Days, Patient Injury Falls Per 1000 Patient Days and Unassisted Patient Falls.

Chapter 4 will aim to elaborate on the data collection methods, time-frame for data-collection, discrepancies in data-collection, baseline demographics and descriptive characteristics of the sample, as well as relevant statistical analyses focused on descriptive, as well as inferential statistics relevant to answering the research questions and fulfilling the research aims.

Data Collection

The data utilized in this study were collected from the NDNQI Survey 2018 (Q1 and Q2). As the chief aim of this retrospective study was to utilize the present data gathered for the NDNQI Database of Nursing Quality Indicators to evaluate RN

Satisfaction and associated nursing quality measurements from Q1 and Q2 of 2018, the data collection primarily focused on drawing on the existing body of research as well. Descriptive statistics was, therefore, used to summarize the data. The data present was coded into themes and associated variables. HPPD allocated by RNs in each unit and facility were analyzed using descriptive statistics. Additionally, bivariate relationships were examined between the dependent variables namely patient fall and injury outcomes and potential independent variables of statistical significance were then identified for a factorial MANOVA using SPSS (Version 26) for data pertaining to Q1 to evaluate the relationship between three IVs, Consultation with Nursing Administrator, Freedom To Adjust Practice, and RNs Forced to Work, and three DVs namely patient falls per 1000 patient days, injury falls per 1000 patient days, and number of unassisted patient falls across data for Q1. A comparison between Q1 and Q2 data with respect to key IV and DV interaction effects was analyzed using multiple regression analysis, utilizing SPSS. Multivariate analysis of variance served as an inferential tool for this research study. Additionally, descriptive statistics namely frequency, distribution, SD and percentages were utilized to describe the data and present a holistic picture regarding the relationship between RN Engagement and patient/nursing outcomes with a special focus on fall and injury rates.

Results

Descriptive Statistics

The nurse engagement outcomes were identified through the means of responses to the NDNQI survey for Q1, as presented below:

Hours Per Patient Day. This useful metric serves to provide an in-depth understanding of the hours per patient day allocated by the nursing units and facilities over a period of Q1 as compared to Q2.

For Q1 and Q2, the total nursing hours per patient day unit wise are presented in figures 1 and 2.

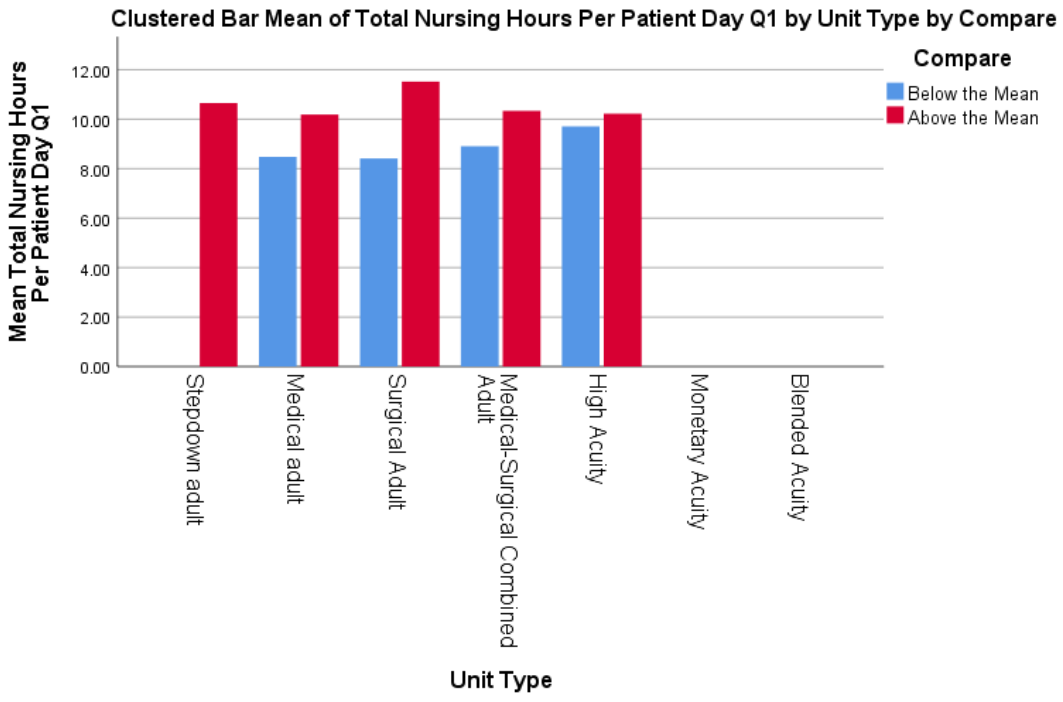

Figure 2. Total nursing hours per patient day unit wise for Q1.

As can be seen, the medical and surgical adult units were most likely to devote more total nursing hours per patient day Q1.

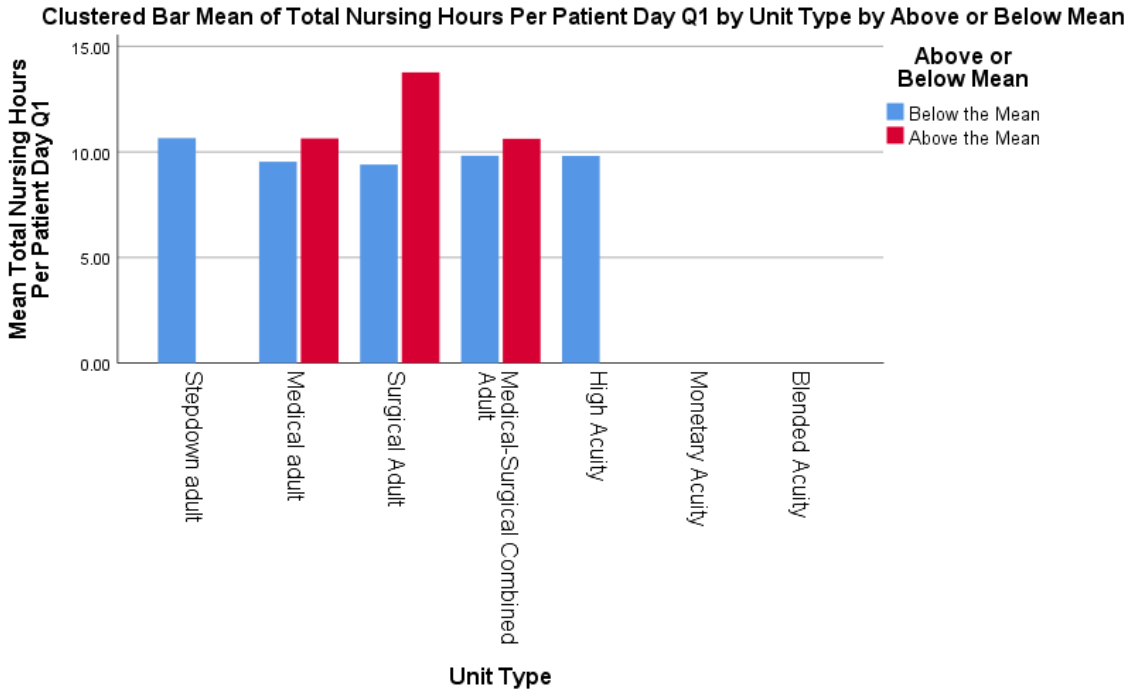

Figure 3. Total nursing hours per patient day Q2.

In contrast, stepdown adult units were likelier to have less total nursing hours per patient day, in Q2 as opposed to Q1, although the Medical Adult, Surgical Adult, and Medical Surgical Combined Adult units scored the highest number of total nursing hours per patient day.

The frequencies, SD, distribution and percentages of the total nursing hours per patient day are conceptualized in Table 1. Comparison in terms of the HPPD for Q1 and Q2 showed that RN nurses displayed higher levels of engagement and invested in greater number of nursing hours per patient day during the second quarter as against the first.

Table 1

Total Nursing Hours Per Patient Day Q1 and Q2

	Total nursing hours per patient Day Q1	Total nursing hours per patient Day Q2
Valid	38	38
Missing	0	0
Median	10.1851	10.3456
Mode	7.87[a]	8.37[a]
Std. Deviation	1.07062	.79350
Variance	1.146	.630
Skewness	.776	-.040
Std. Error of Skewness	.383	.383
Kurtosis	2.584	.125
Std. Error of Kurtosis	.750	.750
Range	5.90	3.55

Minimum	7.87	8.37
Maximum	13.76	11.93

a: Multiple modes exist. The smallest value is shown.

In Table 2 that follows, it can be inferred 76.3% of the nurses were fairly engaged, working above the mean or average number of hours. Levels of engagement, however, did vary across the second quarter and were marginally higher.

Table 2

Total Nursing Hours Per Patient Day Q1

	Frequency	Percentage	Valid percentage	Cumulative percentage
Below the mean	9	23.7	23.7	23.7
Above the mean	29	76.3	76.3	100.0
Total	38	100.0	100.0	

The cumulative percent, valid percent, frequency distribution and percentage tables for total nursing hours per patient day above and below are for the second quarter.

Table 3

Total Nursing Hours Per Patient Day Q2

				Cumulative
	Frequency	Percentage	Valid percentage	percentage
Valid	Below the Mean	8	21.1	21.1
	Above the Mean	30	78.9	78.9
	Total	38	100.0	100.0

Total nursing hours per patient day for the second quarter indicate a majority of the nurses were fairly engaged with 78.9% of the RNs working hours above the mean value (see Table 3). Table 3 also shows just 21.1% of the RN nurses invested less time in caring for the patients.

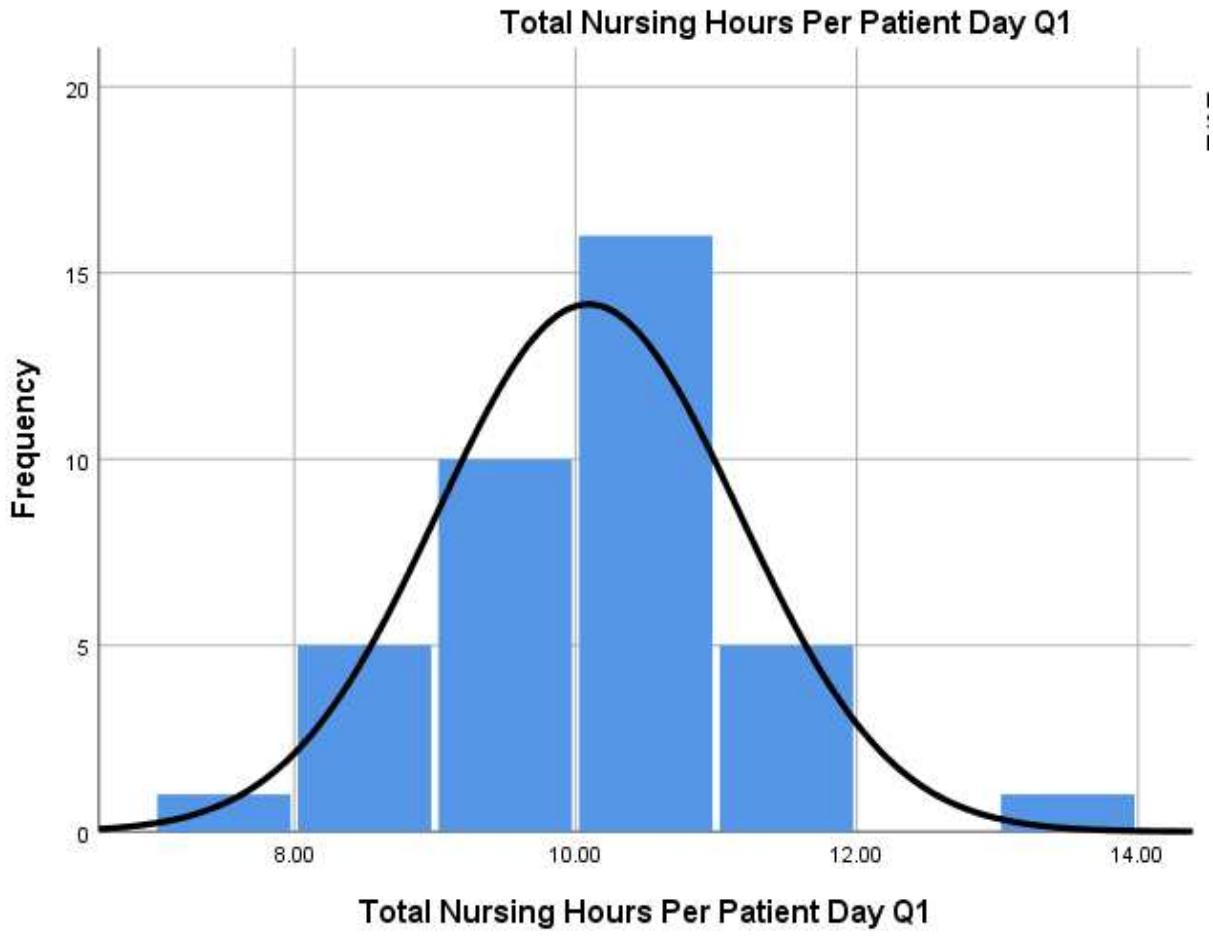

Figure 4. Total nursing hours per patient day Q1 normal distribution curve

The normal distribution curve for total nursing hours per patient day QI and Q2 are also presented (see Figures 4 and 5). The data is mostly symmetric and the mean and median values for QI represent a normal distribution (see Figure 4). The total nursing hour per patient day Q2 shows a distribution curve skewed towards the left, with most of the data concentrated to the right side of the curve and the mean is smaller than the median (see Figure 5).

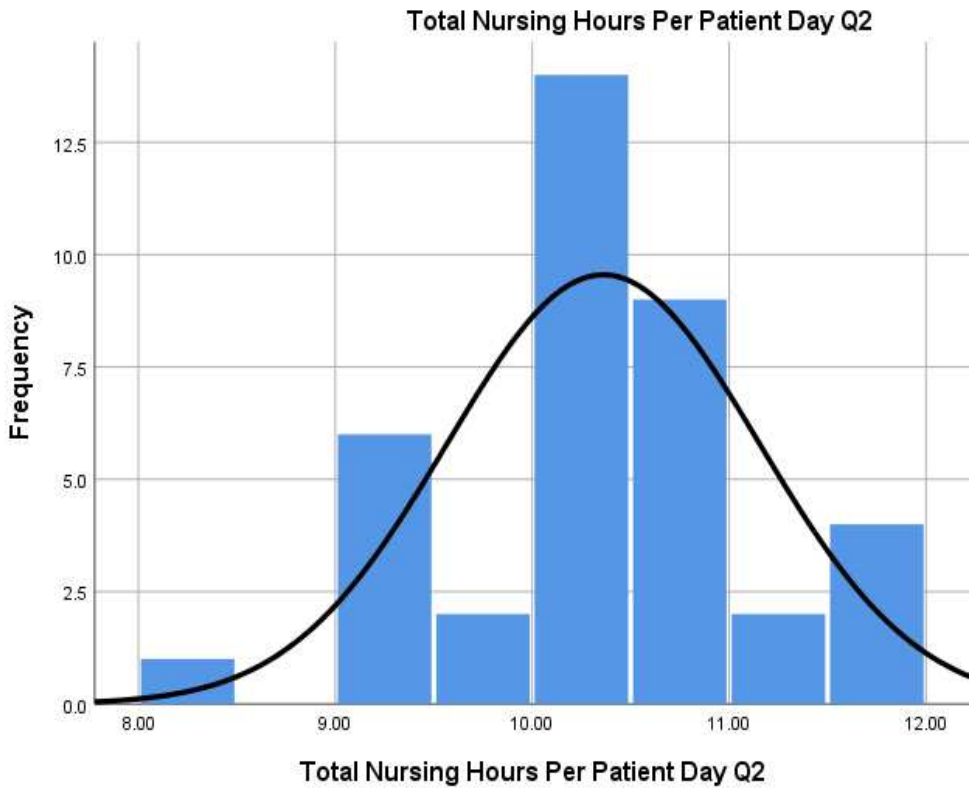

Figure 5. Total nursing hours per patient day Q2 normal distribution curve

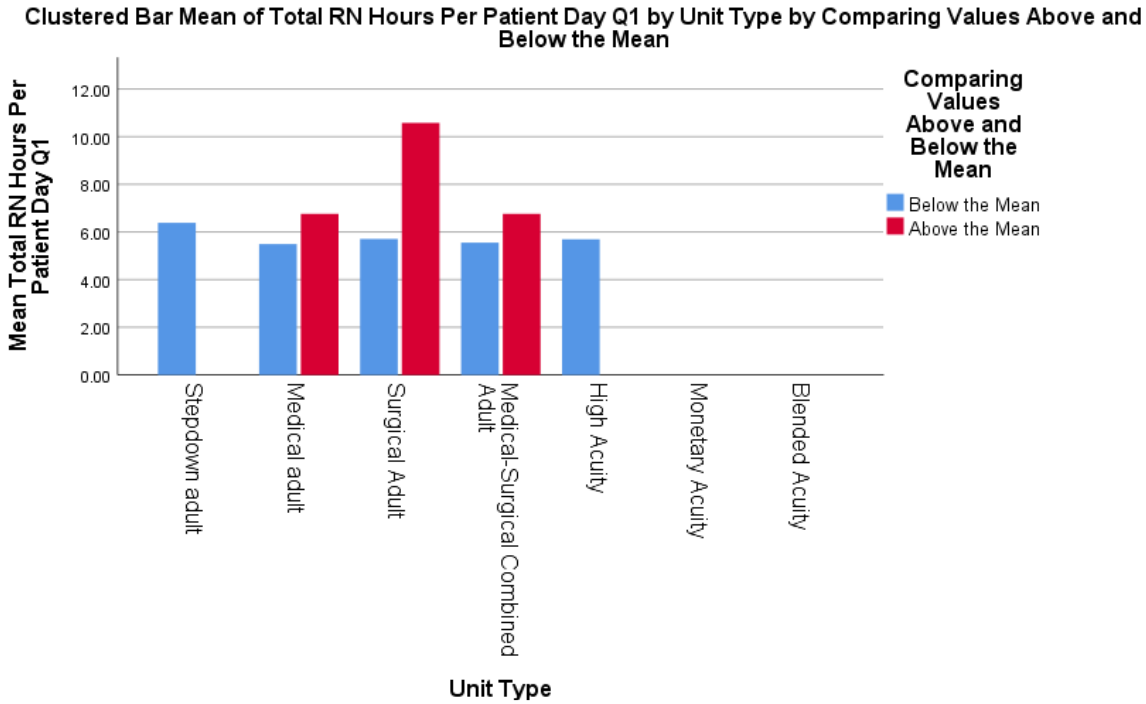

Figure 6. Mean RN hours per patient day QI per unit type

The mean RN hours per patient day Q1 per unit type in Figure 6 show that for surgical, medical adult and medical surgical adult combined units show higher number of RNs spending hours per patient day above mean value (See Figure 6). The same trend is also observed across Q2 (See Figure 7).

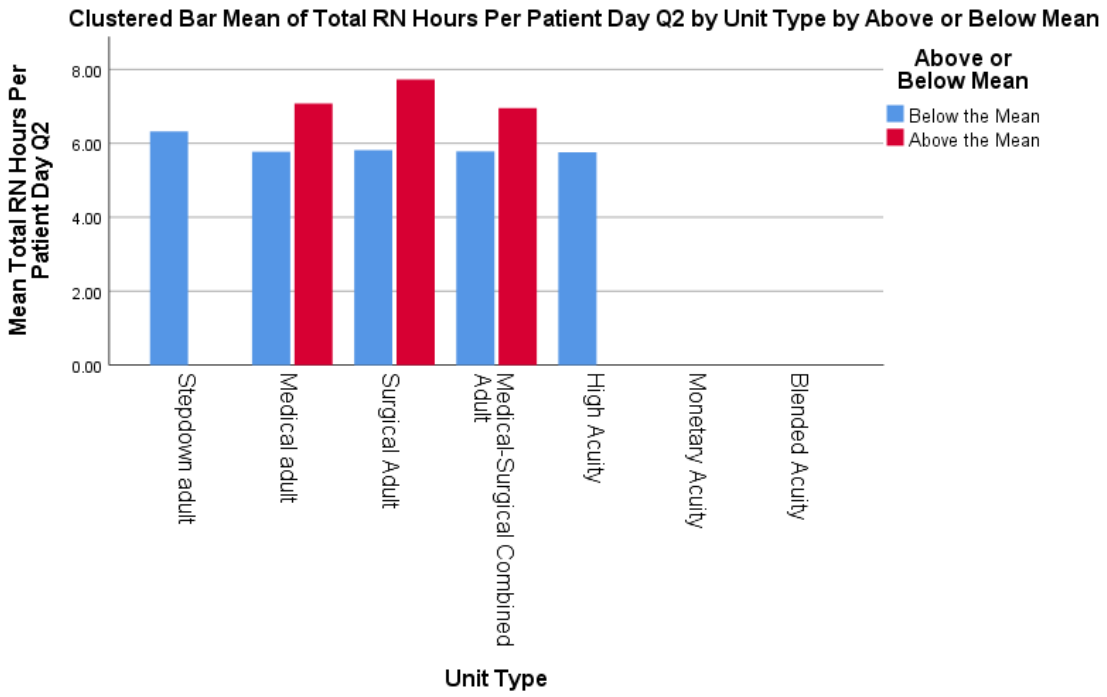

Figure 7. Total RN hours per patient day Q2 per unit type

The total RN nursing hours for Q1, however, shows 23% of the nurses were below the mean for Q1 (See Table 4), while the trend is repeated in Q2 as well with 25% of the RNs reporting total RN hours worked below the mean or average (See Table 5).

Table 4

Above or Below Mean Total RN Nursing Hours Q1

			Valid	Cumulative
	Frequency	Percent	Percent	Percent
Valid	Below the Mean	23	60.5	60.5
	Above the Mean	15	39.5	39.5
	Total	38	100.0	100.0

Table 4 shows only 39.5% of the RN nurses showed higher levels of engagement as opposed to 60.5% of the RN nurses who clocked hours below the mean, suggesting lower levels of engagement in terms of total RN nursing hours among resident nurses in the first quarter.

Table 5

Above or Below Mean Total RN Nursing Hours Q2

	Frequency	Percent	Valid Percent	Cumulative Percent
Below the Mean	25	65.8	65.8	65.8
Above the Mean	13	34.2	34.2	100.0
Total	38	100.0	100.0	

Table 5 above states the percent of RN nurses clocking total RN nursing hours above or below the mean values. Only 34.2% of the RN nurses were engaged or working above the average number of hours in Q2, while 65.8% of the RN nurses were working below the mean number of hours. Therefore, in terms of total number of RN nursing hours, resident nurses across facilities showed higher levels of engagement during the first quarter as opposed to the second quarter.

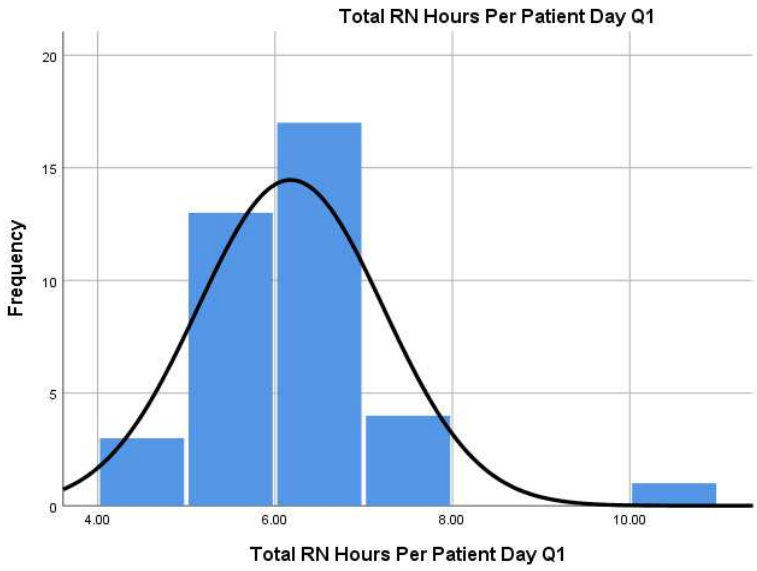

Figure 8. Total RN nursing hours per patient day normal distribution curve Q1

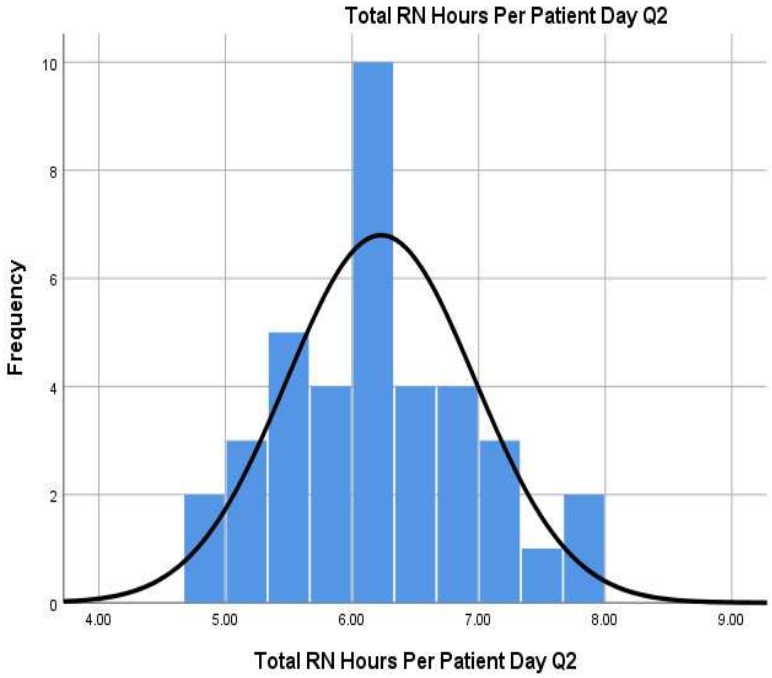

Figure 9. Total RN nursing hours per patient day normal distribution curve Q2

Patient Falls and RN Hours Per Patient Day. The correlation between patient falls and RN hours per patient day is analyzed for Q1.

Correlation between RN hours per patient day and patient falls is a key to understanding if the level of engagement of the nurses is impacting negative patient outcomes. Ideally, there should be a negative, inverse relationship between RN hours per patient day and patient falls, in that the higher the number of hours, the lower the incidence/prevalence of patient falls.

Therefore, the key critical step in understanding how RN engagement impacts nurses' quality of health care services, and in conjunction, the patient outcomes with respect to mortality and morbidity. To test this relationship and examine if the correlation between RN hours per patient days and patient falls is negative and statistically significant, the Pearson Product Moment Correlation was used.

Table 6

Correlation Between Total RN Hours Per Patient Day and Total Number of Patient Falls

		Total RN Hours Per Patient Day Q1	Total Number of Patient Falls Q1	Total RN Hours Per Patient Day Q1
Total RN Hours Per Patient Day Q1	Pearson Correlation		1	-.380*
	Sig. (2-tailed)			.019
	N		38	38
Total Number of Patient Falls Q1	Pearson Correlation		-.380*	1
	Sig. (2-tailed)		.019	
	N		38	38

Note: * Correlation is significant at the .05 level (2-tailed).

As can be observed from the table 6 above, total RN hours per patient day weakly negatively correlated (r = -0.380) with total number of patients falls for Q1. However, the results are statistically significant at .05 level with 95% confidence intervals.

Table 7

Correlation Between Total RN Hours per Patient Day and Total Patient Falls Per 1000 Patient Days

		Total RN Hours Per Patient Day Q1	Total Patient Falls Per 1,000 Patient Days Q1
Total RN Hours Per Patient Day Q1	Pearson Correlation	1	-.293
	Sig. (2-tailed)		.075
	N	38	38
Total Patient Falls Per 1,000 Patient Days Q1	Pearson Correlation	-.293	1
	Sig. (2-tailed)	.075	
	N	38	38

However, in terms of the correlation (r=-0.293) between total RN Hours Per Patient Day and Total Patient Falls Per 1000 Patient Days, the value denotes weak negative correlation which is not statistically significant (see Table 6).

For Q2, the correlation between total RN Hours Per Patient Day and Total Patient Fall was a strong negative correlation (r=-0.602), which was statistically significant at the .01 level, indicating there was a definite negative linear relationship between total RN hours per Patient Day and Total Number of Patient Falls in that as one increases, the other decreases and vice versa (see Table 7).

Table 8

Correlation Between Total RN Hours Per Patient Day and Total Number of Patient Falls Q2

		Total RN Hours Per Patient Day Q2	Total Number of Patient Falls Q2
Total RN Hours Per Patient Day Q2	Pearson Correlation	1	-.602**
	Sig. (2-tailed)		.000
	N	38	38
Total Number of Patient Falls Q2	Pearson Correlation	-.602**	1
	Sig. (2-tailed)	.000	
	N	38	38

Note: **. Correlation is significant at the .01 level (2-tailed).

In Table 8, the value for r is significant at 99% confidence intervals. Therefore, the results point to a strong correlation between RN hours per patient day and number of falls.

Table 9

Correlation Between Total RN Hours Per Patient Day and Total Patient Falls Per 1000 Patient Days Q2

		Total RN Hours Per Patient Day Q2	Total Patient Falls Per 1,000 Patient Days Q2
Total RN Hours Per Patient Day Q2	Pearson Correlation	1	-.488**
	Sig. (2-tailed)		.002
	N	38	38
Total Patient Falls Per 1,000 Patient Days Q2	Pearson Correlation	-.488**	1
	Sig. (2-tailed)	.002	
	N	38	38

Note: **. Correlation is significant at the .01 level (2-tailed).

A moderate negative correlation (r = -0.488) statistically significant at .01 level indicates the relationship between RN Hours Per Patient Days and Total Patient Falls Per 1000 Days suggests the relationship is inverse, to a moderate degree for facilities and units in Q2 (see Table 9).

Falls and RN Engagement. The correlation between Total Patient Falls Per 1000 Patient Days Q1 and key RN engagement variables is presented in Table 10.

Table 10

Correlations Between Patient Falls and RN Engagement Variables

	Total Patient Falls Per 1,000 Patient Days Q1		
	Pearson Correlation	Sig. (2-tailed)	N
Nursing administrators generally consult RNs on our unit about daily problems Q1	.323*	0.048	38
As RNs, we are free to adjust our daily practice to fit patient needs Q1	.327*	0.045	38
I have to force myself to come to work much of the time Q1	.344*	0.034	38

Note: *. Correlation is significant at the .05 level (2-tailed).

As can be inferred from Table 10, the correlation between three independent variables namely Consultation of Nursing Administrators by RNs ("Nursing administrators generally consult RNs on our unit about daily problems Q1"), RNs Forced to Come to Work ("I have to force myself to come to work much of the time Q1") and RN Freedom to Adjust Practice ("As RNs, we are free to adjust our daily practice to fit patient needs Q1") and Patient Falls Per 1000 Patient Days was statistically significant.

Therefore, the MANOVA will be conducted using this combination of independent variables.

Statistical Assumptions

Factorial MANOVA. A factorial MANOVA or Multivariate Analysis of Variance is for testing the relationship between two or more independent and dependent variables, making it well suited for the research purpose.

The first assumption is that two or more dependent variables must be measured in interval or ratio scale (as is noted in the case of the three dependent continuous variables). The second assumption is that the IVs, on the other hand, must consist of categorical independent groups, as is evidenced in the case of the three independent variables categorized as above or below the mean value (as per the Press-Ganey regulations, mean values cannot be reported, but the identified data can be categorized as above or below the mean value). Independence of observations and adequate sample size are other assumptions that are met. MANOVA further involves the decomposition of the total variation and is observed in dependent variables simultaneously. The total variation in MANOVA for y is denoted by $SS_{y,}$or

$$SS_y = SS_{between} + SS_{within}$$

In MANOVA, for all the DVs like $Y_{1,}$ Y_2 and so on indicating the simultaneous decomposition of total variation.

The third assumption is that there should be no multivariate outliers. For assessing multivariate outliers, the Mahalanobis distance was calculated for each of the three DVs as presented below (see Tables 11,12, and 13). Table 11 shows the summary of the regression model for the Number of Unassisted Patient Falls, Injury Falls Per 1000 Patient Days and Total Patient Falls Per 1000 Days for Q1.

Table 11

Regression Model: Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.240[a]	.058	-.026	1.151

Note: a. Predictors: (Constant), Number of Unassisted Patient Falls Q1, Injury Falls Per 1,000 Patient Days Q1, Total Patient Falls Per 1,000 Patient Days Q1

b. Dependent Variable: Unit Type

Table 12

ANOVA [a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.753	3	.918	.692	.563[b]
	Residual	45.063	34	1.325		
	Total	47.816	37			

Note a. Dependent Variable: Unit Type

b. Predictors: (Constant), Number of Unassisted Patient Falls Q1, Injury Falls Per 1,000 Patient Days Q1, Total Patient Falls Per 1,000 Patient Days Q1

Table 12 shows the ANOVA values for the 3 dependent variables associated with the study, while Table 13 shows the coefficient values. The multiple linear regression was run with all the DVs of the MANOVA as the independent variables of the multiple linear regression so as to obtain the value for the Mahalanobis distance and test multicollinearity. For identifying the outlier, the critical chi square value was obtained. This was derived from the critical chi square value at p=.001 with df being the number of dependent variables. With three variables, the critical value was 16.27 so any participants with the Mahalanobis Distance value greater than 16.27 were removed.

Table 13

Coefficients [a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	3.455	.339		10.184	.000
	Total Patient Falls Per 1,000 Patient Days Q1	-.154	.174	-.258	-.886	.382
	Injury Falls Per 1,000 Patient Days Q1	-.183	.279	-.122	-.655	.517
	Number of Unassisted Patient Falls Q1	.121	.116	.282	1.037	.307

Note: a. Dependent Variable: Unit Type

Table 14

Mahalanobis Distance and Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation
Predicted Value	2.48	3.79	3.29	.273
Std. Predicted Value	-2.984	1.852	.000	1.000
Standard Error of Predicted Value	.233	.649	.361	.099
Adjusted Predicted Value	2.70	4.12	3.29	.297
Residual	-1.795	1.962	.000	1.104
Std. Residual	-1.559	1.704	.000	.959
Stud. Residual	-1.694	1.750	.000	1.016
Deleted Residual	-2.119	2.069	.000	1.243
Stud. Deleted Residual	-1.744	1.808	-.002	1.028
Mahal. Distance	.542	10.801	2.921	2.367
Cook's Distance	.001	.208	.033	.041
Centered Leverage Value	.015	.292	.079	.064

The Mahalanobis distance for 3df is 16.27 and the value of 10.801 (see Table 14) is well below it, indicating there are no multivariate outliers for this MANOVA.

Linearity assumes all DVs are linearly related to one another. This was checked through a scatterplot matrix between the DVs. Linearity was met for each group of the MANOVA separately.

Additionally, absence of multicollinearity was checked by conducting correlations among the dependent variables, as seen below (see Tables 15, 16 and 17):

Table 15

Correlation Between Number of Unassisted Patient Falls and Total Patient Falls Per 1000 Days Q1

		Number of Unassisted Patient Falls Q1	Total Patient Falls Per 1,000 Patient Days Q1
Number of Unassisted Patient Falls Q1	Pearson Correlation	1	.783**
	Sig. (2-tailed)		.000
	N	38	38
Total Patient Falls Per 1,000 Patient Days Q1	Pearson Correlation	.783**	1
	Sig. (2-tailed)	.000	
	N	38	38

Note: **. Correlation is significant at the .01 level (2-tailed).

Table 16

Correlation Between Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls Q1

		Injury Falls Per 1,000 Patient Days Q1	Number of Unassisted Patient Falls Q1
Injury Falls Per	Pearson Correlation	1	.221
1,000 Patient Days	Sig. (2-tailed)		.183
Q1	N	38	38
Number of	Pearson Correlation	.221	1
Unassisted Patient	Sig. (2-tailed)	.183	
Falls Q1	N	38	38

Table 17

Correlation Between Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls Q1

		Injury Falls Per 1,000 Patient Days Q1	Number of Unassisted Patient Falls Q1
Injury Falls Per 1,000 Patient Days Q1	Pearson Correlation	1	.221
	Sig. (2-tailed)		.183
	N	38	38
Number of Unassisted Patient Falls Q1	Pearson Correlation	.221	1
	Sig. (2-tailed)	.183	
	N	38	38

Any correlation over .80 presents a concern for multicollinearity. However, this assumption was met as can be inferred from the correlation between the 3 DVs, as observed in tables 15, 16 and 17. As per Table 15, 0.78 was the r value obtained. In Tables 16 and 17, r values stood at 0.21 and 0.22 respectively.

For testing for multivariate normality, the Shapiro-Wilks test of normality was used along with skewness, kurtosis, QQ/PP Plot, and histograms with normal distribution curves

plotted, as evidenced in Tables 18 and 19, showing that the MANOVA was permissible as a means of analyzing the data.

Table 18

Skewness and Kurtosis of the 3 Dependent Variables

			Statistic	Std. Error
Total Patient Falls Per 1,000 Patient Days Q1	Mean		2.7397	.30821
	95% Confidence Interval for Mean	Lower Bound	2.1152	
		Upper Bound	3.3642	
	5% Trimmed Mean		2.6409	
	Median		2.9985	
	Variance		3.610	
	Std. Deviation		1.89991	
	Minimum		.00	
	Maximum		7.42	
	Range		7.42	
	Interquartile Range		2.84	
	Skewness		.404	.383
	Kurtosis		.008	.750
Injury Falls Per 1,000 Patient Days Q1	Mean		.6968	.12278
	95% Confidence Interval for Mean	Lower Bound	.4480	
		Upper Bound	.9456	
	5% Trimmed Mean		.6285	
	Median		.6443	
	Variance		.573	
	Std. Deviation		.75686	
	Minimum		.00	
	Maximum		2.95	
	Range		2.95	

(*table continues)*

			Statistic	Std. Error
	Skewness		1.072	.383
Number of Unassisted	Kurtosis		.836	.750
Patient Falls Q1	Mean		3.18	.431
	95% Confidence Interval for Mean		Lower	2.31
			Bound	
		Upper Bound	4.06	
	5% Trimmed Mean	3.01		
	Median		3.00	
	Variance		7.073	
	Std. Deviation		2.660	
	Minimum		0	
	Maximum		10	
	Range		10	
	Interquartile Range		4	
	Skewness		.710	.383
	Kurtosis		-.105	.750

Table 19

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Total Patient Falls Per 1,000 Patient Days Q1	.083	38	.200*	.952	38	.107
Injury Falls Per 1,000 Patient Days Q1	.216	38	.000	.854	38	.000
Number of Unassisted Patient Falls Q1	.146	38	.041	.924	38	.013

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Furthermore, Q-Q plots of the different variables were also ascertained to determine the type of distribution of the data (see Appendix D). Box plots were also created to assess the suitability of the data for a MANOVA analysis (see Appendix D for each of the dependent variables). The QQ plots showed a good fit with the normal distribution assumption in that the points lie close to the straight line. Furthermore, the box plots were reasonably elliptical, supporting multivariate normality.

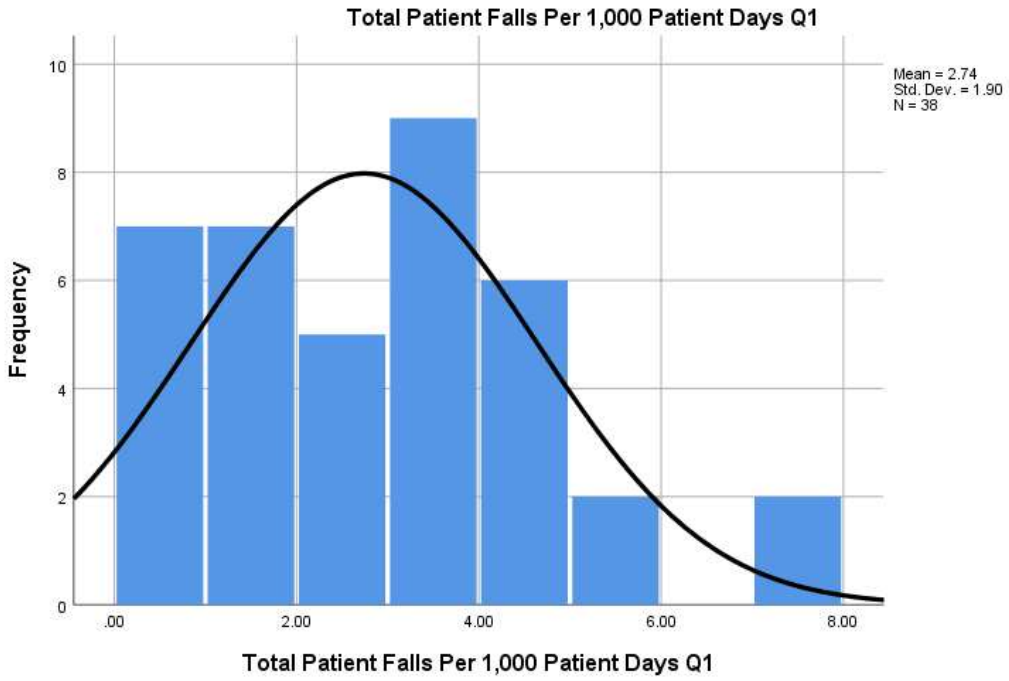

Figure 10. Normal distribution curve for total patient falls per 1000 patient days, Q1.

For the DVs, normal distribution curves for each of the variables were plotted for Q1 (see Figures 10, 11 and 12).

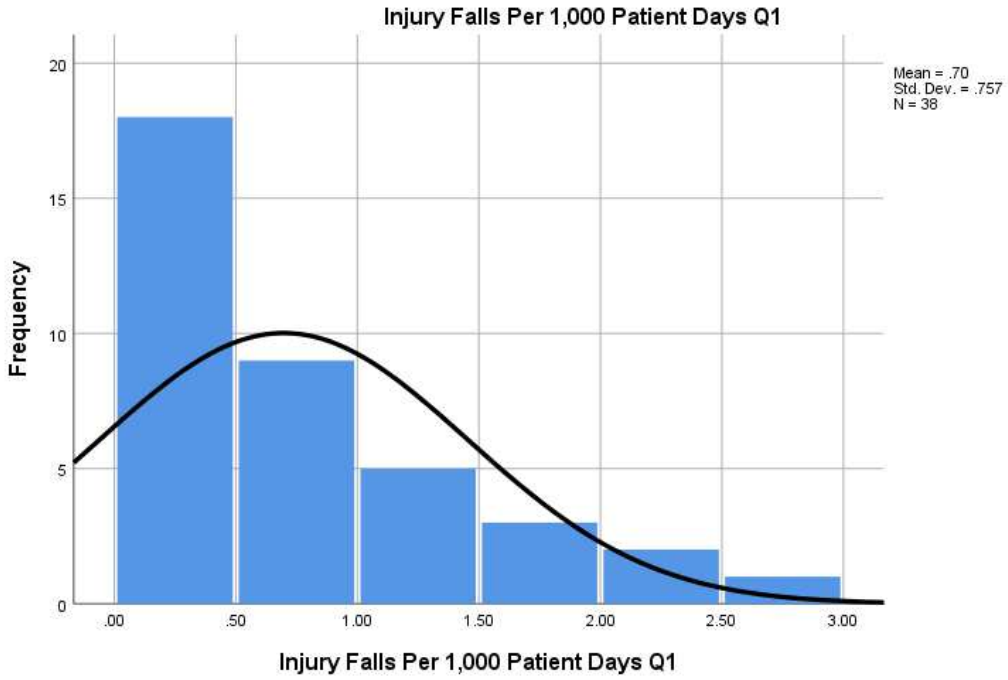

Figure 11. Normal distribution curve for injury falls per 1000 patient days Q1.

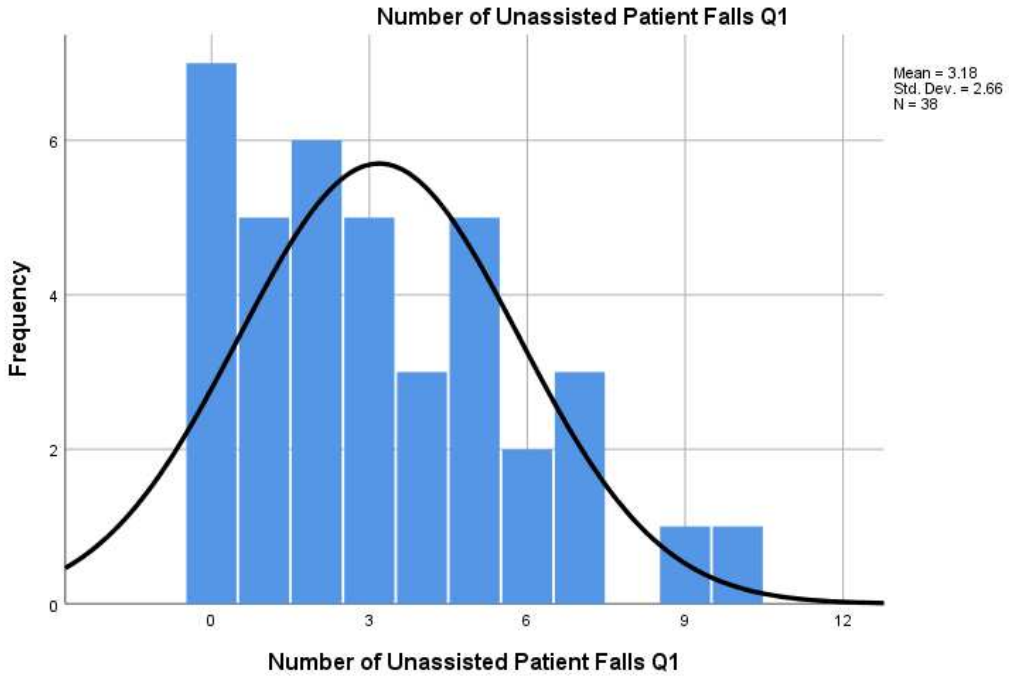

Figure 12. Normal distribution curve for number of unassisted patient falls Q1.

Equality of covariances matrices was an assumption checked by running the Box's M test (see table 20). Significance or *p* value for the test was >.001.

Table 20

Box's Test of Equality of Covariance Matrices[a]

Box's M	36.468
F	2.078
df1	12
df2	377.068
Sig.	.018

Note: Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + ConsultationRegardingProblems + ForcedtoCometoWork + FreetoAdjustPractice + ConsultationRegardingProblems * ForcedtoCometoWork + ConsultationRegardingProblems * FreetoAdjustPractice + ForcedtoCometoWork * FreetoAdjustPractice + ConsultationRegardingProblems * ForcedtoCometoWork * FreetoAdjustPractice

By running the Box's M test, we are checking the equality of covariance matrices. The level of significance for the Box's M test is typically .001. The *p* value for the test is above .001 so the assumption is met.

Statistical Analysis

See Appendix E Table 1 for the group effects. The *p* value for Consultation with RN Administrator Regarding Problems is not significant (.873), while the Freedom to Adjust Practice and RN Forced to Come to Work *p* values are also not statistically significant, as p>0.05**.**

As per the Levene's Test of Equality of Error Variances, the *p* values are not statistically significant indicating assumption of homogeneity of variance has been met (see Appendix E, Table 2).

In terms of the descriptive statistics, the MANOVA results for each of the three dependent variables suggest the values above the mean are higher than values below the mean, in testing interaction effects across the IVs (See Appendix E, Tables 3,4 and 5)

Table 21

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
Corrected Model	Total Patient Falls Per 1,000 Patient Days Q1	18.636[a]	6	3.106	.880	.522	159	5.281	.288
	Injury Falls Per 1,000 Patient Days Q1	3.089[b]	6	515	.872	..527	.158	5.234	.286
	Number of Unassisted Patient Falls Q1	24.067[c]	6	4.011	.524	.785	101	3.144	.178
Intercept	Total Patient Falls Per 1,000 Patient Days Q1	65.442	1	65.442	18.546	.000	398	18.546	.986

(*Table continues)*

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
	Injury Falls Per 1,000 Patient Days Q1	6.676	1	6.676	1.312	.002	288	11.312	.901
	Number of Unassisted Patient Falls Q1	65.627	1	65.627	.573	.007	234	8.573	.807
Consultation Regarding Problems	Total Patient Falls Per 1,000 Patient Days Q1	517	1	517	.147	.705	005	.147	.066
	Injury Falls Per 1,000 Patient Days Q1	.099	1	.099	.168	.685	.006	.168	.068
	Number of Unassisted Patient Falls Q1	142	1	.142	.019	.893	.001	.019	.052

(*Table continues)*

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
Free to Adjust Practice	Total Patient Falls Per 1,000 Patient Days Q1	6.304	1	6.304	1.787	.192	.060	1.787	.252
	Injury Falls Per 1,000 Patient Days Q1	.022	1	.022	.037	.848	.001	.037	.054
	Number of Unassisted Patient Falls Q1	9.884	1	9.884	1.291	.265	.044	1.291	.195
Forced to Come to Work	Total Patient Falls Per 1,000 Patient Days Q1	8.975	1	8.975	2.544	.122	.083	2.544	.338
	Injury Falls Per 1,000 Patient Days Q1	.458	1	.458	.776	386	.027	.776	.136

(*Table continues)*

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
	Number of Unassisted Patient Falls Q1	5.103	1	5.103	.667	.421	.023	.667	.124
Consultation Regarding Problems * Free to Adjust Practice	Total Patient Falls Per 1,000 Patient Days Q1	2.970	1	2.970	.842	367	.029	.842	.144
	Injury Falls Per 1,000 Patient Days Q1	.003	1	.003	.005	.943	.000	.005	.051
	Number of Unassisted Patient Falls Q1	.236	1	.236	.031	.862	.001	.031	.053
Consultation Regarding Problems * Forced to Come to Work	Total Patient Falls Per 1,000 Patient Days Q1	.074	1	.074	.021	.886	.001	.021	.052

(*Table continues)*

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
	Injury Falls Per 1,000 Patient Days Q1	.188	1	.188	.318	.577	.011	.318	.085
	Number of Unassisted Patient Falls Q1	4.622	1	4.622	.604	.444	.021	.604	.117
Free to Adjust Practice * Forced to Come to Work	Total Patient Falls Per 1,000 Patient Days Q1	6.770	1	6.770	1.919	.177	.064	1.919	.267
	Injury Falls Per 1,000 Patient Days Q1	.712	1	.712	1.207	.281	.041	1.207	.186

(*Table continues)*

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
	Number of Unassisted Patient Falls Q1	8.417	1	8.417	1.100	.303	.038	1.100	.173
Consultation Regarding Problems * Free to Adjust Practice * Forced to Come to Work	Total Patient Falls Per 1,000 Patient Days Q1	.000	0	.	.	.	.000	.000	.
	Injury Falls Per 1,000 Patient Days Q1	.000	0	.	.	.	.000	.000	.
	Number of Unassisted Patient Falls Q1	.000	0	.	.	.	.000	.000	.

(*Table continues)*

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
Error	Total Patient Falls Per 1,000 Patient Days Q1	98.800	28	3.529					
	Injury Falls Per 1,000 Patient Days Q1	16.525	28	590					
	Number of Unassisted Patient Falls Q1	214.333	28	7.655					
Total	Total Patient Falls Per 1,000 Patient Days Q1	407.159	35						
	Injury Falls Per 1,000 Patient Days Q1	39.645	35						

(*Table continues)*

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[d]
	Number of Unassisted Patient Falls Q1	643.000	35						
Corrected Total	Total Patient Falls Per 1,000 Patient Days Q1	117.437	34						
	Injury Falls Per 1,000 Patient Days Q1	19.614	34						
	Number of Unassisted Patient Falls Q1	238.400	34						

Note: a. R Squared = .159 (Adjusted R Squared = -.022)

b. R Squared = .158 (Adjusted R Squared = -.023)

c. R Squared = .101 (Adjusted R Squared = -.092)

d. Computed using alpha = .05

Table 21 above displays tests of between-subject effects for the dependent variables. For each of the DVs, in interaction with each IV, the results show the variance is not

statistically significant for most cases. Furthermore, the partial eta squared values show the amount of variation associated with the IV explained by each DV. As the null hypotheses held true for all four research questions, results were not statistically significant and no main interaction effects were observed. A large F ratio would have implied the variation between group means is more than observed by chance. Therefore, for each of the 3 DVs, the interaction effect of each IV is not statistically significant, in that the independent variables namely Freedom to Adjust Practice, RN Forced to Come to Work and Consultation Regarding Problems and their interactions do not have statistically significant effect on the variance of the three dependent variables. The results clearly support the null hypotheses that there is no statistically significant variance between group means suggesting RN engagement levels do not exert a statistically significant effect on patient fall and injury outcomes.

Research Question 1

RQ1: Is there a significant variance between the groups with respect Consultation of Nursing Administrators by RNs in units and facilities under study for Q1 and Patient Falls Per 1000 Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls?

H_o1: There is no statistically significant variance between the means of the groups on Consultation of Nursing Administrators in the facilities studied for Q1, 2018 and

Patient Falls Per 1000 Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls.

H_a1: There is a statistically significant variance between the means of groups on Consulting of Nursing Administrators in the facilities and units under study for Q1, 2018, and Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

RQ1 examined if there was a significant variance between the means of groups with respect to RN engagement (Consultation of Nursing Administrators by RNs) and fall/injury outcomes (Patient Falls Per 100 Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls). The table above shows that for the Consultation with RN Administrators Regarding Problems, the *p* value is not significant at .05 level for Total Patient Falls Per 1000 Patient Days for Q1 (*estimate =.705, p>.05)*, and the Number of Unassisted Patient Falls for Q1 (*estimate = .685, p>.05)*. Additionally, the *p* value for the Injury Falls Per 1000 Patient Days Q1 is not statistically significant (*estimate=.893, p>.05*). The contrast matrix exploring the K matrix for Consulting RN Nursing Administrators. When the values for both the levels, Below the Mean and Above the Mean for Consulting Nursing Administrators is compared across the 3 DVs, it is inferred that the differences are not statistically significant for Total Patient Falls Per 1000 Patient Days (*estimate=.756, p>.05)* , Injury Falls Per 1000 Patient Days (*estimate=.734, p>.05)* and the Number of Unassisted Patient Falls for Q1 (*estimate. 967, p>.05)*. F-ratios centered around 1.00 indicating support for the null hypothesis. Thus, Hypothesis 1 is not supported.

Table 22

Contrast Results (K Matrix)

Consulting Nursing Administrators Simple Contrast[a]			Dependent Variable: Total Patient Falls Per 1,000 Patient Days Q1	Dependent Variable: Injury Falls Per 1,000 Patient Days Q1	Dependent Variable: Number of Unassisted Patient Falls Q1
Level 2 vs. Level 1	Contrast Estimate		-.286	.128	-.056
	Hypothesized Value		0	0	0
	Difference (Estimate - Hypothesized)		-.286	.128	-.056
	Std. Error		.912	.373	1.343
	Sig.		.756	.734	.967
	95% Confidence Interval for Difference	Lower Bound	-2.155	-.636	-2.807
		Upper Bound	1.582	.892	2.696

Note: a= Reference category = 1

The contrast effects or K Matrix is presented in Table 22. Multivariate and univariate test results suggest no support for Hypothesis 1 (see Tables 23 and 24)

.

Table 23

Multivariate Test Results

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Pillai's trace	.023	.206[a]	3.000	26.000	.891	.023	.617	.083
Wilks' lambda	.977	.206[a]	3.000	26.000	.891	.023	.617	.083
Hotelling's trace	.024	.206[a]	3.000	26.000	.891	.023	.617	.083
Roy's largest root	.024	.206[a]	3.000	26.000	.891	.023	.617	.083

a. Exact statistic

b. Computed using alpha = .05

The multivariate test results show there is no statistically significant difference in patient fall and injury outcomes based on RN engagement variables ($F(3.26)= .206$, $p>.005$, Wilk's $\Lambda = .977$, partial $\eta^2 = .23$).

Table 24 displays the univariate test results. As the results are not statistically significant, (*$p>0.005$*), there is no corresponding variance among the DVs in response to the IVs suggesting no difference in group values for the DV above or below the mean in response to varying levels of RN engagement.

Table 24

Univariate Test Results

Source	Dependent Variable	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Contrast	Total Patient Falls Per 1,000 Patient Days Q1	.348	1	.348	.099	.756	.004	.099	.061
	Injury Falls Per 1,000 Patient Days Q1	.069	1	.069	.117	.734	.004	.117	.063
	Number of Unassisted Patient Falls Q1	.013	1	.013	.002	.967	.000	.002	.050

(*Table continues)*

Source	Dependent Variable	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Error	Total Patient Falls Per 1,000 Patient Days Q1	98.800	28	3.529					
	Injury Falls Per 1,000 Patient Days Q1	16.525	28	.590					
	Number of Unassisted Patient Falls Q1	214.333	28	7.655					

a. Computed using alpha = .05

Research Question 2

RQ2: Is there a significant variance between groups on RNs Forced to Come to Work in facilities and units under study for Q1 and Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls?

H_o2: There is no statistically significant variance between means of groups on RNs Forced to Come to Work in facilities and units under study for Q1, and Total Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

H_a2: There is a statistically significant variance between means of the groups on RNs Forced to Come to Work in facilities and units under study for Q1, and Total Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

RQ2 queries if there is a significant variance between the means of groups For RNs Forced to Come to Work and Total patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls. The *p* value for RNs Forced to Come to Work was not significant (*estimate= .122, p>.05)* for Total Patient Falls Per 1000 Patient Days. Moreover, the *p* values were not significant for Injury Falls Per 1000 Patient Days (*estimate= .386, p>.05)* or Number of Unassisted Patient Falls (*estimate=.421, p>.05).* The Contrast Matrix for the second IV, RNs Forced to Come to Work, was also indicative of *p* values that were not statistically significant for Total Patient Falls Per 1000 Patient Days

(*estimate=.104, p>.05),* Injury Falls Per 1000 Patient Days (*estimate=.349, p>.50)* and Number of Unassisted Patient Falls for Q1 (*estimate=.499, p>.05).*

Table 25

Contrast Results (K Matrix) For RN Forced to Come to Work

			Dependent Variable		
Forced to Come to Work Simple Contrast[a]			Total Patient Falls Per 1,000 Patient Days Q1	Injury Falls Per 1,000 Patient Days Q1	Number of Unassisted Patient Falls Q1
Level 1 vs. Level 2	Contrast Estimate		-1.758	-.407	-1.056
	Hypothesized Value		0	0	0
	Difference (Estimate - Hypothesized)		-1.758	-.407	-1.056
	Std. Error		1.046	.428	1.540
	Sig.		.104	.349	.499
	95% Confidence Interval for Difference	Lower Bound	-3.900	-1.283	-4.210
		Upper Bound	.384	.469	2.099

Note: [a:] Reference category=2

Hypothesis 2 was not supported. The K-Matrix (see Table 25) suggests weak support for Hypothesis 2. Additionally, F values were not significantly higher than 1.00 indicating support for the null hypothesis.

Additionally, tables 26 and 27 present multivariate and univariate test results for Hypothesis 2. It can be inferred on this basis of these results that high or low levels of RN Forced to Come to Work had no significant difference in terms of group means for all the three DVs. Therefore, whether the RN perception of being forced to come to work is low (below the mean) or high (above the mean), it has no impact on the patient fall or injury outcomes. The multivariate test results showed results that lacked statistical significance ($F(3,26)= 1.709$, $p>.005$, Wilk's $\Lambda =.835$, partial $\eta^2 = .165$).

Table 26

Univariate Test Results

Source	Dependent Variable	Sum of Squares	Df	Mean Square	F	SSig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Contrast	Total Patient Falls Per 1,000 Patient Days Q1	9.978	1	9.978	2.828	.104	.092	2.828	.369
	Injury Falls Per 1,000 Patient Days Q1	.535	1	.535	.907	.349	.031	.907	.151
	Number of Unassisted Patient Falls Q1	3.596	1	3.596	.470	.499	.017	.470	.102
Error	Total Patient Falls Per 1,000 Patient Days Q1	98.800	28	3.529					
	Injury Falls Per 1,000 Patient Days Q1	16.525	28	.590					
	Number of Unassisted Patient Falls Q1	214.333	28	7.655					

Note: a. Computed using alpha = .05

Table 27

Multivariate Test Results

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Pillai's trace	.165	1.709[a]	3.000	26.000	.190	.165	5.127	.393
Wilks' lambda	.835	1.709[a]	3.000	26.000	.190	.165	5.127	.393
Hotelling's trace	.197	1.709[a]	3.000	26.000	.190	.165	5.127	.393
Roy's largest root	.197	1.709[a]	3.000	26.000	.190	.165	5.127	.393

Note: a. Exact statistic

b. Computed using alpha = .05

Research Question 3

RQ3: Is there a significant variance between groups on RN Freedom to Adjust Practice in units and facilities under study in Q1, and Number of Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls?

H_o3: There is no statistically significant variance between group means on RN Freedom to Adjust Practice in units and facilities under study in Q1, and Number of Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls.

H_a3: There is a statistically significant variance between group means on RN Freedom to Adjust Practice in units and facilities under study in Q1 Number of Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls.

The variance across group means for RN Freedom to Adjust Practice were not statistically significant with respect to Total Patient Falls Per 1000 Patient Days (*estimate=.192, p>.05),* Injury Falls Per 1000 Patient Days (*estimate=.848, p>.05)* and Number of Unassisted Patient Falls (*estimate=.265, p>.05)*

The variance between the three groups with respect to RN Forced to Come to Work was not statistically significant as per the K Matrix either (see Table 28) as per *p* values for Total Patient Falls Per 1000 Patient Days (*estimate=.268, p>.05)*, Injury Falls Per 1000 Patient Days (*estimate=.701, p>.05)*and Number of Unassisted Patient Falls (*estimate=.274, p>.05)*. Therefore, the data did not provide support for Hypothesis 3.

Table 28

Contrast Results (K Matrix) for RN Freedom to Adjust Practice

			Dependent Variable		
			Total Patient Falls Per	Injury Falls Per 1,000 Patient Days	Number of Unassisted
Practice Adjusted Simple Contrast[a]			1,000 Patient Days Q1	Q1	Patient Falls Q1
Level 1 vs. Level 2	Contrast Estimate		1.030	-.144	1.500
	Hypothesized Value		0	0	0
	Difference (Estimate - Hypothesized)		1.030	-.144	1.500
	Std. Error		.912	.373	1.343
	Sig.		.268	.701	.274
	95% Confidence Interval for Difference	Lower Bound	-.838	-.909	-1.252
		Upper Bound	2.899	.620	4.252

Note: a. Reference category = 2

Table 29

Multivariate Test Results

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Pillai's trace	.065	.599[a]	3.000	26.000	.621	.065	1.797	.157
Wilks' lambda	.935	.599[a]	3.000	26.000	.621	.065	1.797	.157
Hotelling's trace	.069	.599[a]	3.000	26.000	.621	.065	1.797	.157
Roy's largest root	.069	.599[a]	3.000	26.000	.621	.065	1.797	.157

Note: a. Exact statistic

b. Computed using alpha = .05

As observed in tables 28 and 29, multivariate as well as univariate analysis provides no support for the hypothesis, either. Multivariate test results were not statistically significant ($F(3.26)= .599$, $p>.005$, Wilk's $\Lambda =.93$, partial $\eta^2 = .065$).

Table 30

Univariate Test Results

Source	Dependent Variable	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Contrast	Total Patient Falls Per 1,000 Patient Days Q1	4.501	1	4.501	1.275	.268	.044	1.275	.194
	Injury Falls Per 1,000 Patient Days Q1	.089	1	.089	.150	.701	.005	.150	.066
	Number of Unassisted Patient Falls Q1	9.543	1	9.543	1.247	.274	.043	1.247	.190
Error	Total Patient Falls Per 1,000 Patient Days Q1	98.800	28	3.529					
	Injury Falls Per 1,000 Patient Days Q1	16.525	28	.590					
	Number of Unassisted Patient Falls Q1	214.333	28	7.655					

Note: a->Computed using alpha = .05

Research Question 4

RQ4: Is there a significant relationship between education, HPPD and certification in Q1-Q2 and impact on patient/fall outcomes in Q1-Q2?

H_o4: There is no statistically significant variance between RN Education and Certification and Total RN Nursing Hours Per Patient Day in Q1-Q2 and each of 3 patient fall/injury outcomes namely Patient Falls Per 1000 Patient Days, Patient Injury Falls Per 1000 Patient Days and Unassisted Patient Falls.

H_a4: There is a statistically significant variance between RN Education, Certification, Total RN Nursing Hours Per Patient Day in Q1Q2 and each of 3 patient fall/injury outcomes namely Patient Falls Per 1000 Patient Days, Patient Injury Falls Per 1000 Patient Days and Unassisted Patient Falls.

RQ4 questioned if the impact of RN education, certification and HPPD on patient fall/injury outcomes differed from Q1 to Q2. Multiple regression was conducted to compare the impact of RN education, certification and HPPD on patient fall/injury outcomes in Q1 and Q2. The model summary for Q1 and Q2 suggest variance attributable to the three predictors. The regression coefficient R Square indicates 14.6% of the total variance of Patient Falls Per 1000 Patient Days in Q1 was attributable to the three predictor variables namely Percent of Direct Care RNs with Specialty Nursing Certification Q1, Percent of Direct Care RNs with BSN, MSN, or PhD Q1, Total RN Hours Per Patient Day Q1.

Table 31

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.382[a]	.146	.069	1.85560

a. Predictors: (Constant), Percent of Direct Care RNs with Specialty Nursing Certification Q1, Percent of Direct Care RNs with BSN, MSN, or PhD Q1, Total RN Hours Per Patient Day Q1

As can be observed from the results, for Patient Falls Per 1000 Patient Days, overall correlation with RN education, certification, and HPPD is moderate (r=.382).

Table 32

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	19.470	3	6.490	1.885	.151[b]
	Residual	113.627	33	3.443		
	Total	133.097	36			

Note: a. Dependent Variable: Total Patient Falls Per 1,000 Patient Days Q1

b. Predictors: (Constant), Percent of Direct Care RNs with Specialty Nursing Certification Q1, Percent of Direct Care RNs with BSN, MSN, or PhD Q1, Total RN Hours Per Patient Day Q1

As can be inferred from the ANOVA table above, the results are not statistically significant, however (*estimate=.151, p>.05).* Additionally, the F values are concentrated around 1.00, suggesting the null hypothesis is supported. Therefore, in QI, the three independent variables, Total RN Hours Per Patient Day, Percent of Direct Care RNs with Specialty Nursing Certification, and Percent of Direct Care RNs with BSN, MSN or PhD, are moderately predictive of the total patient falls for this quarter.

Table 33

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	6.019	1.970		3.055	.004
	Total RN Hours Per Patient Day Q1	-.469	.310	-.259	-1.515	.139
	Percent of Direct Care RNs with BSN, MSN, or PhD Q1	.006	.024	.044	.258	.798
	Percent of Direct Care RNs with Specialty Nursing Certification Q1	-.043	.028	-.255	-1.552	.130

Note: a. Dependent Variable: Total Patient Falls Per 1,000 Patient Days Q1

Furthermore, neither RN Hours Per Patient Day, nor RN Education and Certification are unique predictors of patient falls for Q1.

For Q2, regression analysis reveals that RN Hours Per Patient Day is a unique predictor of Total Patient Falls Per 1000 Patient Days.

For data based on which the inferences were drawn, see Tables 34 and 35.

Table 34

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.537[a]	.288	.223	1.75870

Note: a. Predictors: (Constant), Total RN Hours Per Patient Day Q2, Percent of Direct Care RNs with Specialty Nursing Certification Q2, Percent of Direct Care RNs with BSN, MSN, or PhD Q2

The correlational analysis reveals the three predictors have a moderately high correlation with patient falls (r=.537), although results are not statistically significant.

Table 35

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	41.306	3	13.769	4.452	.010[b]
	Residual	102.070	33	3.093		
	Total	143.376	36			

a. Dependent Variable: Total Patient Falls Per 1,000 Patient Days Q2

b. Predictors: (Constant), Total RN Hours Per Patient Day Q2, Percent of Direct Care RNs with Specialty Nursing Certification Q2, Percent of Direct Care RNs with BSN, MSN, or PhD Q2

However, the third predictor, Total RN Hours Per Patient Day, Q2, is associated with a higher p value (*estimate=.006, p>.50)* as against Percent of Direct Care RNs with BSN, MSN, or Phd (*estimate=. 164, p>.05)* or Percent of Direct Care RNs with Specialty Nursing Certification (*estimate= .492, p>.05)* (see tables 34 and 35).

Table 36

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	11.458	2.514		4.558	.000
	Percent of Direct Care RNs with BSN, MSN, or PhD Q2	-.030	.021	-.218	-1.422	.164
	Percent of Direct Care RNs with Specialty Nursing Certification Q2	.018	.026	.104	.696	.492
	Total RN Hours Per Patient Day Q2	-1.179	.402	-.444	-2.931	.006

a. Dependent Variable: Total Patient Falls Per 1,000 Patient Days Q2

For Injury Falls Per 1000 Patient Days, Q1 results reveal the correlation between the DV and the 3 predictors to be low, but positive (r=.209).

Table 37

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.209[a]	.044	-.043	.77442

a. Predictors: (Constant), Total RN Hours Per Patient Day Q1, Percent of Direct Care RNs with Specialty Nursing Certification Q1, Percent of Direct Care RNs with BSN, MSN, or PhD Q1

Table 38

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.906	3	.302	.503	.683[b]
	Residual	19.791	33	.600		
	Total	20.697	36			

Note: a. Dependent Variable: Injury Falls Per 1,000 Patient Days Q1

b. Predictors: (Constant), Total RN Hours Per Patient Day Q1, Percent of Direct Care RNs with Specialty Nursing Certification Q1, Percent of Direct Care RNs with BSN, MSN, or PhD Q1

As can be inferred from the ANOVA table (see Table 38), results are not statistically significant either (*estimate=.683, p>.05)*.

Table 39

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.435	.822		.529	.600
	Percent of Direct Care RNs with Specialty Nursing Certification Q1	-.010	.012	-.147	-.849	.402
	Percent of Direct Care RNs with BSN, MSN, or PhD Q1	.010	.010	.173	.963	.343
	Total RN Hours Per Patient Day Q1	-.013	.129	-.018	-.098	.923

a. Dependent Variable: Injury Falls Per 1,000 Patient Days Q1

The IVs are not unique predictors of the DV in this case (see Table 39).

Table 40

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.425[a]	.181	.106	.72048

Note: a. Predictors: (Constant), Total RN Hours Per Patient Day Q2, Percent of Direct Care RNs with Specialty Nursing Certification Q2, Percent of Direct Care RNs with BSN, MSN, or PhD Q2

The above table 40 shows a moderate correlation between the 3 IVs and the DV for the second quarter (r=.425). The results are not statistically significant, although the third IV, RN Hours Per Patient Day is a unique predictor of Injury Falls Per 1000 Patient Days, in Q2, as evidenced from the table 41 below:

Table 41

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.781	3	1.260	2.428	.083[b]
	Residual	17.130	33	.519		
	Total	20.911	36			

Note: a. Dependent Variable: Injury Falls Per 1,000 Patient Days Q2

b. Predictors: (Constant), Total RN Hours Per Patient Day Q2, Percent of Direct Care RNs with Specialty Nursing Certification Q2, Percent of Direct Care RNs with BSN, MSN, or PhD Q2

Table 42

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.624	1.030		2.548	.016
	Percent of Direct Care RNs with Specialty Nursing Certification Q2	-.003	.011	-.045	-.279	.782
	Percent of Direct Care RNs with BSN, MSN, or PhD Q2	.014	.009	.258	1.568	.126
	Total RN Hours Per Patient Day Q2	-.411	.165	-.405	-2.495	.018

Note: a. Dependent Variable: Injury Falls Per 1,000 Patient Days Q2

Finally, the Number of Unassisted Patient Falls for Q1 in relation to these 3 predictors or IVs was also examined (see Table 42).

Table 43

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.540[a]	.291	.227	2.364

Note: a. Predictors: (Constant), Percent of Direct Care RNs with Specialty Nursing Certification Q1, Percent of Direct Care RNs with BSN, MSN, or PhD Q1, Total RN Hours Per Patient Day Q1

A moderately high correlation exists between the DV (Number of Unassisted Patient Falls) and the three IVs for QI. Results obtained were statistically significant (*estimate=.009, p<.05)* and at least one of the IVs (Total RN Hours Per Patient Day Q1) was a unique predictor for the three DVs (*estimate=.002, p<.05)* (see tables 43 and 44).

Table 44

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	75.845	3	25.282	4.524	.009[b]
	Residual	184.425	33	5.589		
	Total	260.270	36			

a. Dependent Variable: Number of Unassisted Patient Falls Q1

b. Predictors: (Constant), Percent of Direct Care RNs with Specialty Nursing Certification Q1, Percent of Direct Care RNs with BSN, MSN, or PhD Q1, Total RN Hours Per Patient Day Q1

Table 45

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	10.683	2.510		4.257	.000
	Total RN Hours Per Patient Day Q1	-1.307	.395	-.515	-3.311	.002
	Percent of Direct Care RNs with BSN, MSN, or PhD Q1	.023	.030	.118	.765	.450
	Percent of Direct Care RNs with Specialty Nursing Certification Q1	-.038	.035	-.162	-1.085	.286

Note: a. Dependent Variable: Number of Unassisted Patient Falls Q1

In contrast, the Q2 results indicate that RN Hours Per Patient Day Q2 is a unique predictor of Number of Unassisted Patient Falls, and that all three IVs are positively correlated with the DV in a statistically significant manner (*estimate=.00, p<0.01, r=.663).*

Therefore, Hypothesis 4 was not supported. Although some IVs like Total RN Nursing Hours Per Patient Day were correlated with the patient fall and injury outcomes in a

statistically significant way across Q1 and Q2 and were unique predictors of the DVs, others failed to establish a statistically significant relationship across both quarters.

Table 46

Correlation Between Nursing Foundations for Quality Care, Job Enjoyment and RN/RN MD Interactions

	Job Enjoyment Q1		RN-RN Interactions Q1		RN-MD Interactions Q1	
	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)
Active staff development or continuing education programs for nurses Q1	0.505	0.307	-.926**	0.008	-.941**	0.005

(*Table continues)*

	Job Enjoyment Q1		RN-RN Interactions Q1		RN-MD Interactions Q1	
	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)
A clear philosophy of nursing that pervades the patient care environment Q1	-0.407	0.424	.875*	0.023	0.640	0.171
Nursing Foundations for Quality of Care Q1	0.566	0.242	-.897*	0.015	-.965**	0.002
Working with nurses who are clinically competent Q1	-0.465	0.353	.963**	0.002	.944**	0.005

(Table continues)

	Job Enjoyment Q1		RN-RN Interactions Q1		RN-MD Interactions Q1	
	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)
An active quality assurance program Q1	0.537	0.272	-.934**	0.006	-.939**	0.005
A preceptor program for newly hired RNs Q1	-0.531	0.278	.919**	0.010	.910*	0.012
Nursing care is based on a nursing, rather than a medical, model Q1	0.784	0.065	-0.750	0.086	-0.697	0.124

(*Table continues)*

	Job Enjoyment Q1		RN-RN Interactions Q1		RN-MD Interactions Q1	
	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)
Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next Q1	0.559	0.249	-.929**	0.007	-.957**	0.003
Use of nursing diagnoses Q1	0.509	0.303	-.909*	0.012	-.963**	0.002
Staffing and Resource Adequacy Q1	0.560	0.248	-.934**	0.006	-.937**	0.006

(*Table continues)*

	Job Enjoyment Q1		RN-RN Interactions Q1		RN-MD Interaction Q1	
	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)
Enough time and opportunity to discuss patient care problems with other nurses Q1	0.719	0.107	-.860*	0.028	-.895*	0.016
Enough registered nurses to provide quality patient care Q1	.843*	0.035	-0.778	0.068	-0.696	0.125
Enough staff to get the work done Q1	.833*	0.039	-0.730	0.100	-0.689	0.130

* Correlation is significant at the 0.01 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

As can be inferred from the table 46, certain components of the Nursing Foundations for Quality Care Model have a strong linear relationship with Job Enjoyment ("Enough registered nurses to provide quality patient care Q1" and "Enough staff to get work done"). Additionally, RN-RN Interactions and RN-MD interactions are strongly correlated with different components of the model as well.

Summary

The objective of this retrospective study was to determine if RN engagement impacts patient fall/injury outcomes and the direction of the relationship. MANOVA was used to assess if variance in DV groups across different IVs was statistically significant. Four hypotheses formed part of this study, which also sought to determine the role of the Nursing Quality Care Model in the context of variables such as Job Enjoyment, RN-RN Interaction, and RN-MD Interaction. The study also used regression analysis to compare the RN engagement variables, RN Education, RN Certification and RN Nursing Hours Per Patient Day, across three DVs measuring patient fall/injury outcomes across Q1 and Q2. No statistically significant relationships were established through the MANOVA testing the role of the 3 IVs – Consulting RN Administrators, Freedom to Adjust Practice, RN Forced to Work – and their influence on patient outcomes such as Total Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls for Q1. There was no support for the four hypotheses due to non-statistically significant associations among the variables studied, with the exception of the IVs such as RN-RN Interaction or Total RN Nursing Hours Per Patient Day and their impact on patient fall/injury outcomes. Support for the Nursing Quality Care Model was limited in view of restricted data and the utilization of basic correlational analyses to examine the bivariate relationship of the model's components with RN nursing environment and quality of work life.

The findings will be discussed in Chapter 5 whereby the results will be examined in light of present research. Additionally, future directions and recommendations for research will also be proposed.

Chapter 5: Discussion, Conclusion and Recommendations

Introduction

The purpose of this retrospective, longitudinal study relying on the NDNQI data was to examine whether and how RN Satisfaction/Engagement impacts patient fall/injury outcomes. The study was designed to evaluate and discuss the role of key RN engagement variables and their role in impacting patient fall and injury outcomes in medical units and facilities in the Midwest for 2018, Q1 and Q2. It is critical to understand the impact of practice environment on nursing engagement, and, in turn, patient outcomes for influencing policies and interventions in the right direction. In Chapter 5, I focus on discussing the findings from the study, drawing critical conclusions, indicating how the study impacts positive social change and drawing up recommendations for further research.

The study was conducted to examine fall and injury outcomes in patients and examine whether RN engagement and satisfaction can impact patient outcomes and whether the relationship between the variables under study is statistically significant. This study may contribute to a greater comprehension of the role of practice environment and aspects of RN engagement such as Nursing Participation in Hospital Affairs, Nurse Manager Ability, Nursing Foundations for Quality of Care, Staffing and Resource Adequacy, RN-MD or RN-RN Interactions, Leadership and Support of Nurses, Job Enjoyment, RN Nursing Hours Per Patient Day, among others. The key focus of this study was to identify “organizational characteristics of a work setting that facilitate or

constrain professional nursing practice" (Lake, 2002, p. 178). The study may, therefore, impact the effectiveness of nursing professionals and medical staff at key facilities and units, besides impacting patient injury/fall/mortality outcomes. It may also contribute to better policymaking and implementation of interventions that enhance the quality and affordability of health care services. Such findings can, therefore, contribute to positive social change within the medical setting.

In this study, I found a statistically significant negative correlation between Total RN Hours Per Patient Day and Total Patient Falls Per 1000 Patient Days. This points to a linear relationship between the two variables, whereby as one decreases, the other increases and vice versa. This finding implies that RN Engagement and patient mortality and morbidity outcomes may be linked and that HPPD may impact the patient fall/injury outcomes. However, no statistically significant relationships supported the four hypotheses identified for this study. In comparing the effect of RN Education, RN Certification and HPPD across the three dependent variables, Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Patient Falls, regression analysis suggests only RN Total Nursing Hours Per Patient Day was a significant predictor of unassisted fall rates, although the correlation with injury and patient falls were not statistically significant. The study used secondary data from 13 participating facilities in the Midwest in the same health care system with a focus on medical, surgical and medical surgical units in particular, gathering data from the NDNQI survey 2018, QI and Q2.

The NDNQI RN Survey utilizes the Practice Environment Scale comprising the Practice Environment Scale of Nursing Work Index (Lake, 2002), along with the Nurse-Nurse Interaction (adapted from NDNQI's Job Satisfaction Scales R Survey), Job Enjoyment (Brayfield & Rothe, 1951; Taunton et al., 2004), nurse characteristic and work context items. The Practice Environment Scale-Nursing Work Index (PES-NWI), Nurse-Nurse Interaction, as well as Job Enjoyment are measured at unit or group level, like other NDNQI indicators. The National Quality Forum (National Quality Forum, 2004) endorses the PES-NWI. NQF's mission is to enhance American health care through consensus-linked national standards for public reporting and measurement of health care performance data providing information about whether care is timely, safe, beneficial, efficient, affordable, equitable and patient-centric. RN Job Enjoyment is linked to RN job plans, work context, quality of medical care, ratings of last shift worked, nature of breaks and overtime (Aiken, Clarke & Sloane, 2002; Rogers, Hwang & Scott, 2004). RN characteristic items included race, age, gender, education and tenure.

I collected data for Q1 and Q2, 2018, to assess the impact, if any, of RN Engagement and Satisfaction, apart from work context and environment in influencing the Nursing Foundations for Quality of Care and influencing patient fall/injury outcomes. The impact of RN Engagement on patient mortality is well-documented. However, the intervening role of practice environment needs to be explored in the context of patient fall and injury outcomes, while studying the influence of RN engagement variables. Data from the 13 facilities were collected and I worked with a Quality Coordinator to ensure the de-identified dataset was used as per Press-Ganey regulations. Data collected

included the Nursing Foundations for Quality of Care model and its components as well for 6 Magnet institutions seeking to further explore their efficacy and effectiveness as medical facilities, and key RN Engagement variables, besides information pertaining to RN Certification, RN Education, RN Engagement/Satisfaction, and data associated with Patient Falls, Injury Falls, and Assisted/Unassisted Patient Falls. MANOVA was used to examine whether the variance between group means was statistically significant and the Multivariate Analysis of Variance design facilitated an examination of the main and interaction effects of 3 DVs – Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls – and 3 IVs, namely Consulting with the RN Administrator, RN Forced to Work, and RN Freedom to Adjust Practice. All assumptions of MANOVA were met and three hypotheses were tested using this method. Regression analyses was utilized to test the fourth hypothesis.

The Nursing Work Life Model developed by Leiter and Laschinger (2006) served as a theoretical basis for this study. The model holds that critical aspects of a nurse's work environment interact to impact engagement, burnout and consequent patient wellness and health outcomes as well as quality of care offered. The model examines five interrelated elements impacting RN accomplishment, burnout and engagement, identified by Ballard, Boyle and Bott (2015) as transformational nursing leadership, RN-MD collaboration, staffing adequacy, nursing model of care and policy decisions. Adverse events were further added to the model by Leiter and Laschinger (2006). The authors found that when nurses achieved a greater sense of accomplishment, they were more sensitive and open to patient welfare and offered better delivery of health care services.

Interpretation of Findings

In this section, I will present the key findings of this study, in relation to the four hypotheses examined. The first research question concerned whether there was a statistically significant variance between group means with respect to Consulting with RN Administrator and the three DVs – Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days and Number of Unassisted Falls. The findings of the study did not support the first hypothesis. There was an absence of statistically significant variance between the group means in relation to the IV under consideration and the 3 DVs.

The second research question asked whether there was a statistically significant variance between group means with respect to RNs Forced to Work and the three DVs. The second hypothesis was not supported, because the *p* values reported were not statistically significant while comparing the variance between group means.

The third research question queried whether there was a statistically significant variance between group means for RNs Freedom to Adjust Practice and the three dependent variables under consideration. The third hypothesis was not supported, due to non-statistically significant associations.

The fourth research question examined if there was a relationship between education, certification or HPPD and the three DVs. Although the findings did not support the fourth hypothesis, research results did indicate a sizable linear relationship between HPPD and the three DVs – Patient Falls Per 1000 Patient Days, Injury Falls Per 1000 Patient Days, and Number of Unassisted Patient Falls.

Past studies have largely supported the relationship between RN engagement and patient outcomes (Dunton et al., 2004, Hart et al. 2006, Montalvo, 2007). However, the results of this study failed to find a statistically significant association between a majority of the RN engagement variables and patient fall/injury outcomes, contradicting previous research. The study did, however, establish the role of RN-RN Interaction, RN-MD Interaction and to some extent, Job Enjoyment in impacting Nursing Foundations for Quality of Care. The significant correlation between three IVs selected for this study and the three DVs also suggests a positive linear relationship between RN engagement and patient fall/injury outcomes.

The study has relevance for the present health care milieu in America, where the focus is on improving patient recovery outcomes. Nursing homes, facilities, units and hospitals need to be able to work on improving and enhancing quality of care. Inpatient falls are a serious problem in the medical and health care setting, causing injury, extended stay in hospitals and exorbitant medical bills (Bouldin et al., 2013; Dunne, Gaubory & Ashe, 2004). The value of exploring how RN engagement interacts with work context to influence patient outcomes is immeasurable. Most organizations study retention statistics, and quality assessment standards. Health care institutions should not lag behind with respect to this. The importance of this research lies in its relevance for health care professionals in the US looking to hone their skills and formulate effective health interventions besides providing quality are to patients.

Limitations

Limitations of this study were considerable, in terms of the data gaps due to the closeness of the Q1-Q2 period for the NDNQI survey, 2018. Furthermore, data for the Nursing Foundations for Quality of Care was only available for the 6 Magnet institutions seeking to improve their service delivery standards. Besides missing data, the biggest hurdle for this research study was the inability to report mean values, due to the Press-Ganey regulations for de-identified datasets. This challenge was overcome by coding values above or below the mean, which then served to categorize the independent variable into high (1) or low (0) groups, depending on whether they fell above or below the mean. Additionally, the MANOVA assumptions were met, but the results obtained were not statistically significant, and this could be on account of the missing data or use of secondary rather than primary methods of data collection.

Additionally, the study was conducted without first-hand, or primary information, pointing to possible biases and errors in data collection at the stage of the NDNQI research itself, thereby preventing the present study from being generalizable to the population it intended to apply conclusions to by studying the sample of 13 facilities (N=38). The sample size was also limited on account of the data availability concerns. Consequently, the research may have been a product of a limited view of RN engagement in relation to work context and fall/injury outcomes.

Recommendations

The recommendations for further research would center on creating an intervention-based study that could examine the role of RN Engagement in impacting

health care service delivery by implementing programs and initiatives designed to improve patient quality of life and mortality outcome.

Additionally, more qualitative and mixed-methods studies would benefit the nursing practitioners and researchers to better comprehend the role of RN Engagement in impacting patient falls from the perspective of nurses, MDs and the patients themselves more effectively. More case studies, hermeneutical perspectives and grounded theory research could serve to supplement the existing and voluminous body of quantitative research that deploys advanced statistical techniques like Structural Equation Modeling. Additionally, studies should be carried out over a longer period of time. Vignette based studies and narratives could form the basis of a richer subset of data to draw inferences from.

Implications of the Findings

The study confirmed many of the previous research findings. Additionally, many implications for research stem from the conclusions of this study, as well. Primarily, the inference that can be drawn is regarding the centrality of RN engagement and satisfaction in impacting the practice environment directly, and patient outcomes, in turn. I would advocate for a more sensitive approach to nursing administration and guidance to facilitate the competencies of health care professionals in diverse nursing settings. Given that the implications of the research hold value for ensuring health care is affordable and effective, the researcher would also advocate for a training intervention to foster engagement toward the workplace and enable RN nurses to offer quality care.

To understand why nursing administrators and managers need to work towards a conducive practice environment, this research study offers many differing accounts of the complexity of the relationship between variables like RN education, RN freedom to adjust practice, RN certification, HPPD, and patient outcomes such as morbidity, mortality and severity of health issues. In examining the relationship between RN engagement and patient falls, this study holds valuable lessons for the nursing researcher, practitioner and health care management of key facilities and units across the medical field. The findings have special relevance for mainstream health care facilities such as medical and surgical units, where complete recovery is absolutely critical for the continued survival of the patient. In assessing how nursing engagement impacts falls and injuries, the research also clears the way for future studies to examine the interlinkages between RN nurses' engagement, practice environment and patient outcomes.

Strategic management is the need of the hour for health care facilities and institutions to enable nurses to tap inner competencies and acquired skills in order to provide a better quality of service and deescalate the rising cost of health care in America. To enable patients, caregivers and the wider society to actually benefit from health care services, appropriate management and RN nursing administration measures and policies must be in place. Early detection of health care problems is only possible if the nursing professional is engaged and alert. For fostering deeper levels of workplace engagement, it is essential to promote a positive work atmosphere and inculcate key skills and competencies in nursing professionals. As health care professionals such as RN nurses provide valuable care, support, and patient education to enable effective recovery

outcomes, the study is critical for raising awareness regarding the need for greater health workforce engagement for enhancing patient recovery outcomes.

Conclusion

The present research study was limited in its perspective, relying on secondary data to examine the nature and direction of relationship between RN engagement and falls/injury outcomes in patients in select units and facilities in the Midwest. However, my study did contribute in distinct ways to furthering the understanding of the complexity of the relationship between RN Engagement and fall/injury outcomes and the key role played by the work context or practice environment in such a setting. Using a statistically rigorous approach and a well-tested model, the study lays the foundation for more comprehensive research that examines RN engagement and its influence on not just patient morbidity, but injury, recovery and ultimately, mortality, well-being and wellness.

In analyzing the effect of RN Engagement or Satisfaction on patient fall and injury outcomes, the study contributes to the existing research literature in new and innovative ways. By studying the variance between group means as a function of RN engagement variables and testing key dependent variables, besides utilizing regression and correlational analyses, the study establishes a groundwork for more complex body of research. Quantitative, qualitative and mixed methods studies each have their own strengths. In utilizing sophisticated statistical analysis, a more cogent and comprehensive examination of the factors influencing the relationship between RN Engagement and fall/injury outcomes was made possible through this study.

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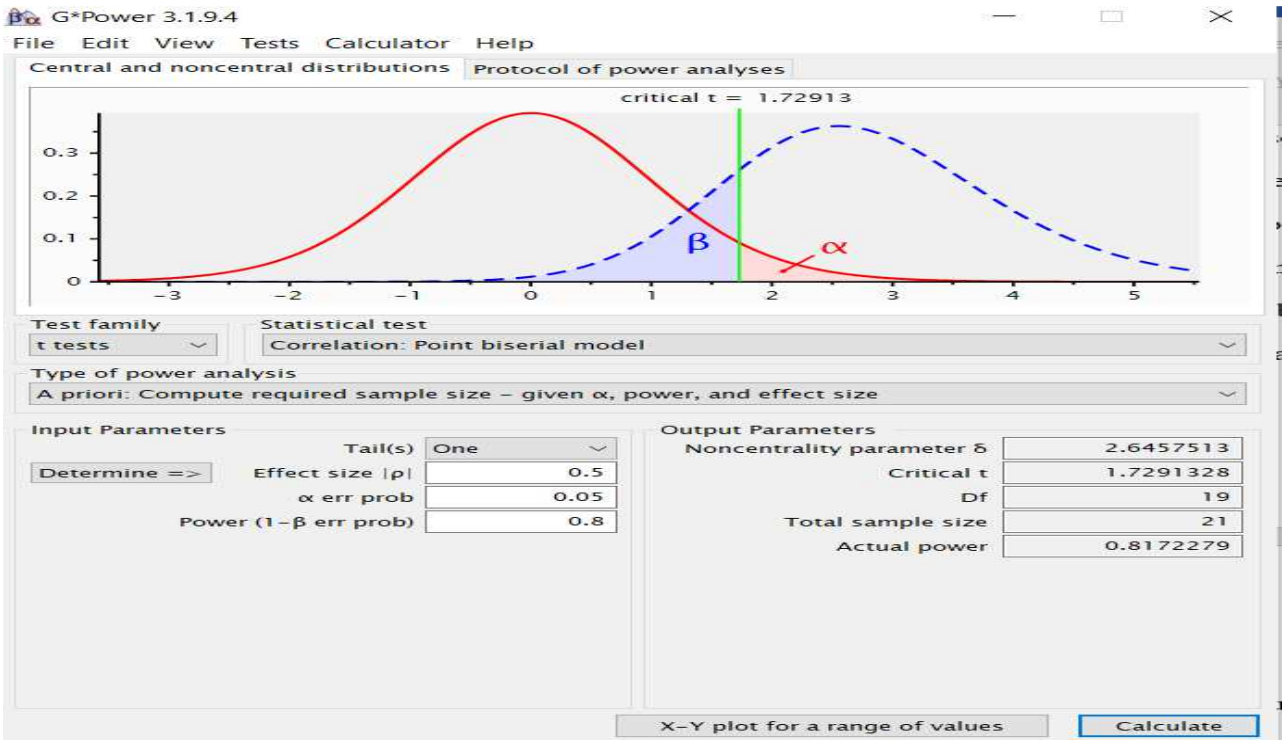
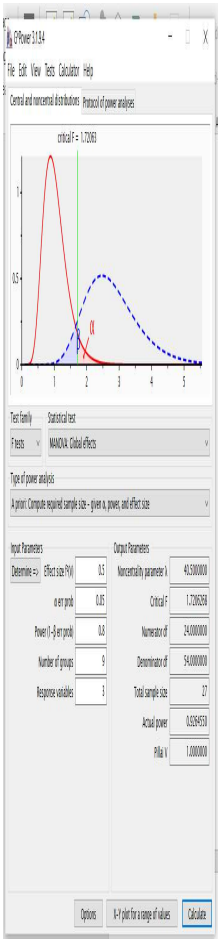
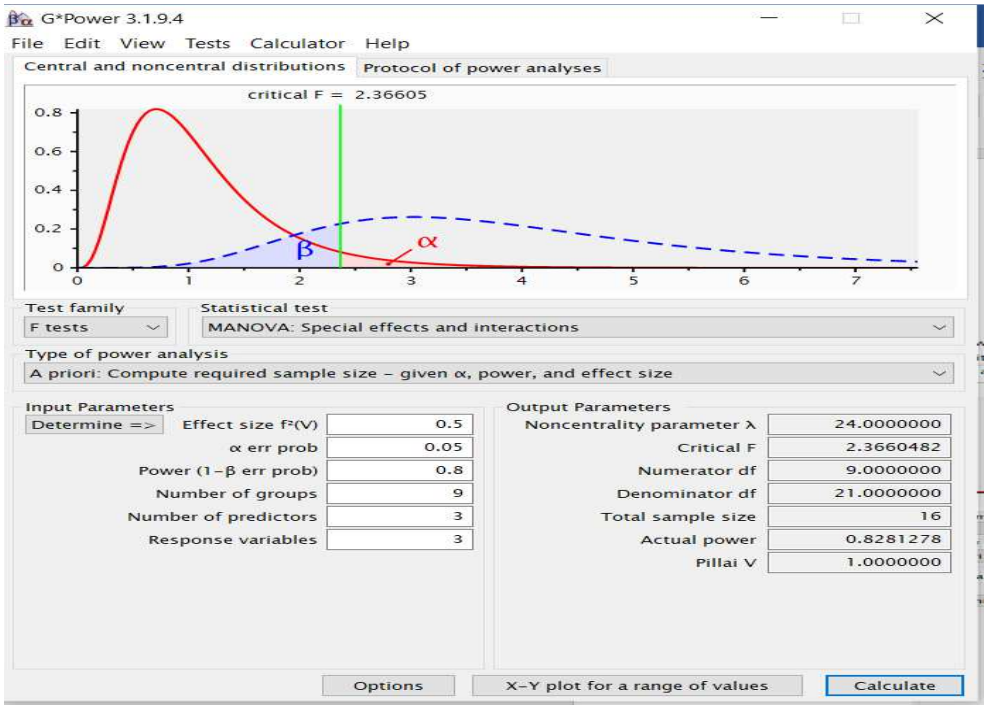
Appendix A: G*Power Sample Size Computation involving Correlational Analysis



Appendix B: G*Power Sample Size Computation involving MANOVA (Global Effect)



Appendix C: G*Power Sample Size Computation involving MANOVA (Special Effects & Interaction


G*Power 3.1.9.4
File Edit View Tests Calculator Help
Central and noncentral distributions
Protocol of power analyses
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0.8
0.6
0.4
0.2
0
0 1 2 3 4 5 6 7
β
α
Test family
F tests
Statistical test
MANOVA: Special effects and interactions
Type of power analysis
A priori: Compute required sample size – given α, power, and effect size
Input Parameters
Determine =>
Effect size f²(V) 0.5
α err prob 0.05
Power (1−β err prob) 0.8
Number of groups 9
Number of predictors 3
Response variables 3
Output Parameters
Noncentrality parameter λ 24.0000000
Critical F 2.3660482
Numerator df 9.0000000
Denominator df 21.0000000
Total sample size 16
Actual power 0.8281278
Pillai V 1.0000000
Options
X-Y plot for a range of values
Calculate

Appendix D

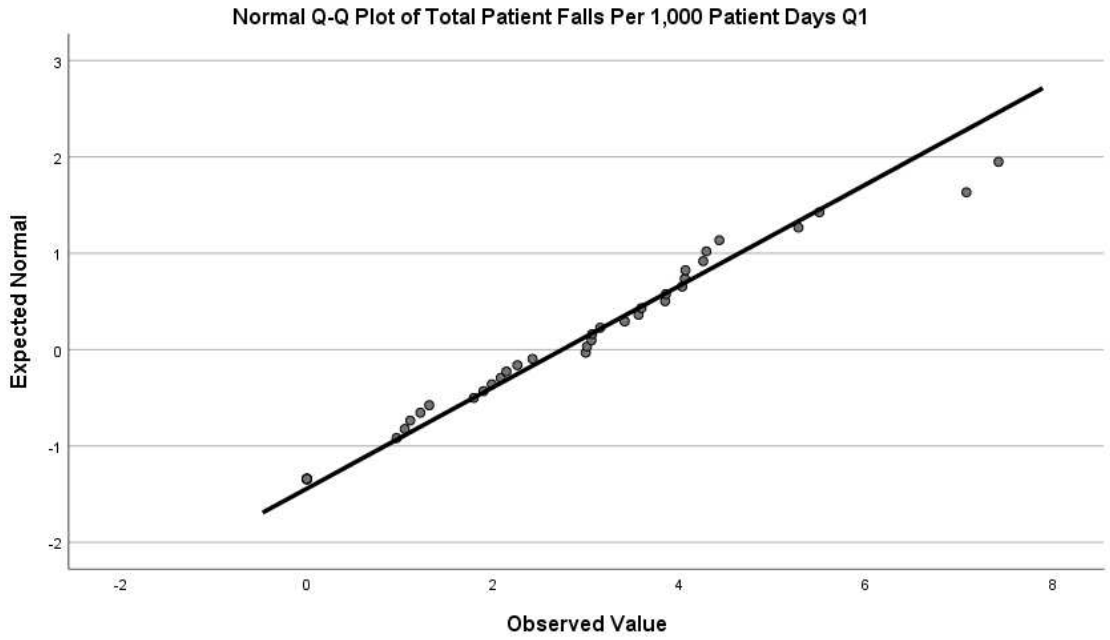

Figure 1. Total patient falls per 1,000 patient days Q1- QQ Plot

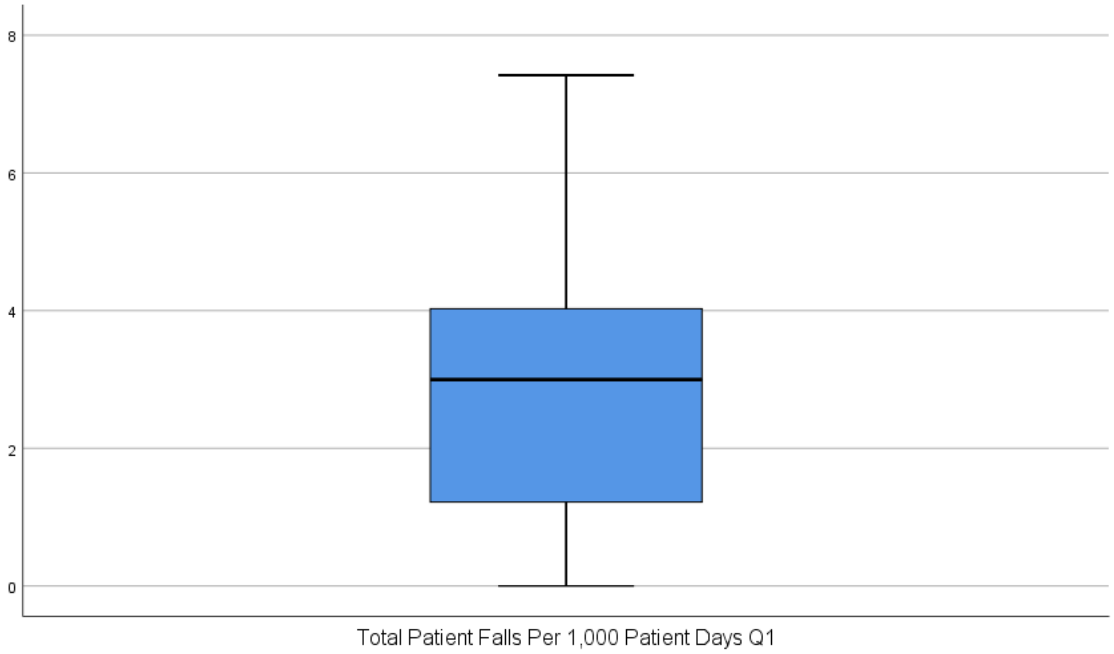

Figure 2. Total patient falls per 1,000 patient days Q1- Box Plot

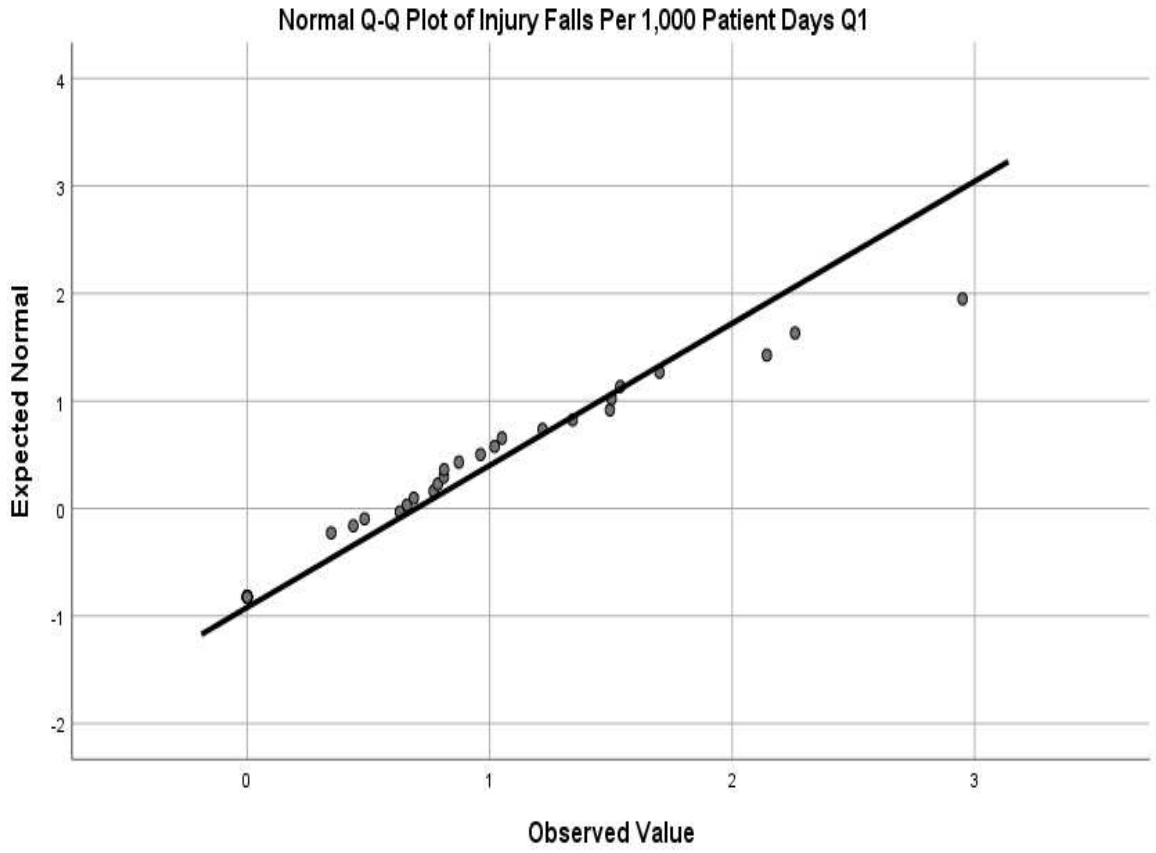

Figure 3. Injury falls per 1,000 patient days Q1, QQ Plot

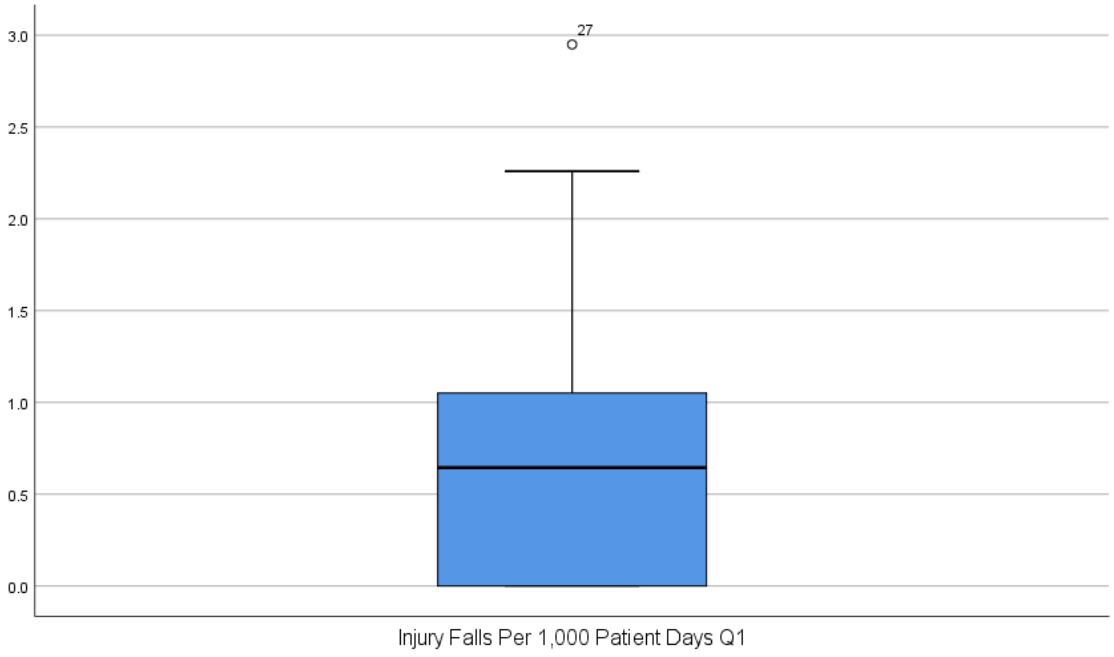

Figure 4. Injury falls per 1,000 patient days Q1 Box Plot

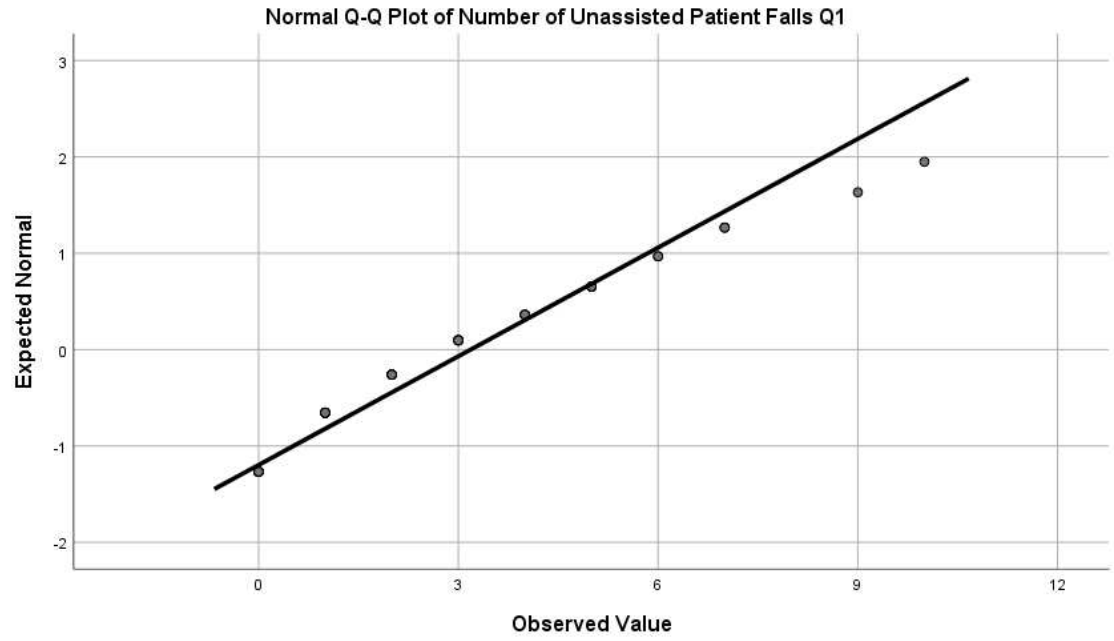

Figure 5. Number of unassisted patients falls *Q1*, QQ Plot

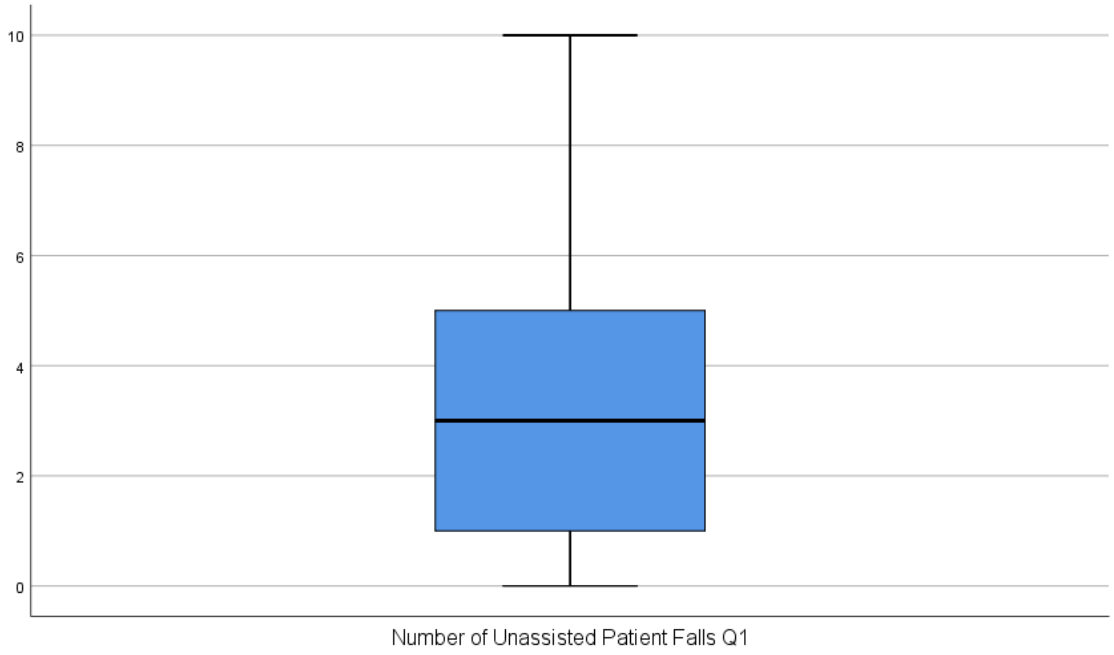

Figure 6. Number of unassisted patients falls Q1, Box Plot

Appendix E

Table 1

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[c]
Intercept	Pillai's Trace	.469	7.654[b]	3.000	26.000	.001	.469	22.961	.973
	Wilks' Lambda	.531	7.654[b]	3.000	26.000	.001	.469	22.961	.973
	Hotelling's Trace	.883	7.654[b]	3.000	26.000	.001	.469	22.961	.973
	Roy's Largest Root	.883	7.654[b]	3.000	26.000	.001	.469	22.961	.973
Consultation Regarding Problems	Pillai's Trace	.026	.233[b]	3.000	26.000	.873	.026	.698	.088
	Wilks' Lambda	.974	.233[b]	3.000	26.000	.873	.026	.698	.088
	Hotelling's Trace	.027	.233[b]	3.000	26.000	.873	.026	.698	.088

(*Table continues)*

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[c]
	Roy's Largest Root	.027	.233[b]	3.000	26.000	.873	.026	.698	.088
Free to Adjust Practice	Pillai's Trace	.075	.705[b]	3.000	26.000	.557	.075	2.116	.179
	Wilks' Lambda	.925	.705[b]	3.000	26.000	.557	.075	2.116	.179
	Hotelling's Trace	.081	.705[b]	3.000	26.000	.557	.075	2.116	.179
	Roy's Largest Root	.081	.705[b]	3.000	26.000	.557	.075	2.116	.179

(*Table continues)*

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[c]
Forced to Come to Work	Pillai's Trace	.126	1.245[b]	3.000	26.000	.314	.126	3.736	.293
	Hotelling's Trace	.144	1.245[b]	3.000	26.000	.314	.126	3.736	.293
	Roy's Largest Root	.144	1.245[b]	3.000	26.000	.314	.126	3.736	.293
Consultation Regarding Problems * Free to Adjust Practice	Pillai's Trace	.167	1.737[b]	3.000	26.000	.184	.167	5.212	.399
	Wilks' Lambda	.833	1.737[b]	3.000	26.000	.184	.167	5.212	.399
	Hotelling's Trace	.200	1.737[b]	3.000	26.000	.184	.167	5.212	.399
	Roy's Largest Root	.200	1.737[b]	3.000	26.000	.184	.167	5.212	.399
Consultation Regarding Problems * Forced to Come to Work	Pillai's Trace	.113	1.109[b]	3.000	26.000	.363	.113	3.327	.264
	Wilks' Lambda	.887	1.109[b]	3.000	26.000	.363	.113	3.327	.264

(*Table continues)*

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[c]
	Hotelling's Trace	.128	1.109[b]	3.000	26.000	.363	.113	3.327	.264
	Roy's Largest Root	.128	1.109[b]	3.000	26.000	.363	.113	3.327	.264
Free to Adjust Practice * Forced to Come to Work	Pillai's Trace	.080	.752[b]	3.000	26.000	.531	.080	2.256	.188
	Wilks' Lambda	.920	.752[b]	3.000	26.000	.531	.080	2.256	.188
	Hotelling's Trace	.087	.752[b]	3.000	26.000	.531	.080	2.256	.188
	Roy's Largest Root	.087	.752[b]	3.000	26.000	.531	.080	2.256	.188
Consultation Regarding Problems * Free to Adjust Practice * Forced to Come to Work	Pillai's Trace	.000	.[b]	.000	.000	.	.	.	.
	Wilks' Lambda	1.000	.[b]	.000	27.000	.	.	.	.

(*Table continues)*

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Non-cent. Parameter	Observed Power[c]
Hotelling's Trace	.000	.[b]	.000	2.000	.	.	.	.
Roy's Largest Root	.000	.000[b]	3.000	25.000	1.000	.000	.000	.050

Note: a. Design: Intercept + Consultation Regarding Problems + Free to Adjust Practice + Forced to Come to Work + Consultation Regarding Problems * Free to Adjust Practice + Consultation Regarding Problems * Forced to Come to Work + Free to Adjust Practice * Forced to Come to Work + Consultation Regarding Problems * Free to Adjust Practice * Forced to Come to Work

b. Exact statistic

c. Computed using alpha = .05

Table 2

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Total Patient Falls Per 1,000 Patient Days Q1	Based on Mean	2.529	4	28	.063
	Based on Median	2.072	4	28	.111
	Based on Median and with adjusted df	2.072	4	23.487	.117
	Based on trimmed mean	2.374	4	28	.076
Injury Falls Per 1,000 Patient Days Q1	Based on Mean	1.071	4	28	.390
	Based on Median	.798	4	28	.536
	Based on Median and with adjusted df	.798	4	18.017	.542
	Based on trimmed mean	1.056	4	28	.397
Number of Unassisted Patient Falls Q1	Based on Mean	1.902	4	28	.138
	Based on Median	1.020	4	28	.414
	Based on Median and with adjusted df	1.020	4	23.729	.417
	Based on trimmed mean	1.944	4	28	.131

Note: Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Consultation Regarding Problems + Free to Adjust Practice + Forced to Come to Work + Consultation Regarding Problems * Free to Adjust Practice + Consultation Regarding Problems * Forced to Come to Work + Free to Adjust Practice * Forced to Come to Work + Consultation Regarding Problems * Free to Adjust Practice * Forced to Come to Work

Table 3.

MANOVA Descriptive Statistics for Total Patient Falls Per 1000 Days

Key Variables	M	SD	N
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	2.5314	1.99568	16
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	3.3559	2.30806	7
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (total)	2.7823	2.07819	23
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	.0000	.	1
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	3.9634	.36291	4
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (total)	3.1707	1.80013	5
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (below $\bar{X}$)	2.3825	2.02750	17
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (above $\bar{X}$)	2.8517	2.00551	28
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	3.0612	.	1
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	3.5483	1.74311	3
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (total)	3.4265	1.44393	4

(table continues)

Key Variables	M	SD	N
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	2.3819	.55869	3
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (above $\bar{X}$)	3.0612	.	1
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (total)	2.9651	1.32227	6
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	2.5626	1.93658	17
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	3.4136	2.05798	10
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (total)	2.8778	1.98730	27
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	.0000	.	1
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	3.2856	.94049	7
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (total)	2.8749	1.45174	8
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (total)* RN Forced to Come to Work (below $\bar{X}$)	2.4202	1.97346	18
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (total)* RN Forced to Come to Work (above $\bar{X}$)	3.3609	1.64871	17
Total Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (total)* RN Forced to Come to Work (total)	2.8771	1.85850	35

Table 4

MANOVA Descriptive Statistics for Injury Falls Per 1,000 Patient Days Q1

Key Variables	M	SD	N
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	.5532	.56968	16
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	.8002	.72943	7
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (total)	.6284	.61635	23
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	.0000	.	1
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	1.2516	1.14915	3
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (total)			
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (below $\bar{X}$)	1.0204	.	1
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (above $\bar{X}$)	.9908	.91444	6
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	.9950	.83484	7
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	.5807	.56311	17
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (total)	.7791	.69398	10

(table continues)

Key Variables	M	SD	N
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	.6542	.60941	27
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (above $\bar{X}$)	.0000	.	1
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (total)	1.2594	1.10550	7
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	1.1020	1.11615	8
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	.5484	.56318	18
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (total)	.9769	.88801	17
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	.7565	.75952	35
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	1.2594	1.10550	7
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (total)	1.1020	1.11615	8
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (total)* RN Forced to Come to Work (below $\bar{X}$)	.5484	.56318	18
Injury Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (total)* RN Forced to Come to Work (above $\bar{X}$)	.9769	.88801	17
Injury Patient Falls Per 1000 Patient Days * Consulting Nurse Administrators (total)* Practice Adjusted (total)* RN Forced to Come to Work (total)	.7565	.75952	35

Table 5.

MANOVA Descriptive Statistics for Number of Unassisted Patient Falls Q1

Key Variables	M	SD	N
Number of Unassisted Patient Falls * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	4.00	3.055	16
Number of Unassisted Patient Falls * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	3.00	2.887	7
Number of Unassisted Patient Falls * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (total)	3.70	2.976	23
Number of Unassisted Patient Falls * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	.00	.	1
Number of Unassisted Patient Falls * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	2.50	1.291	4
Number of Unassisted Patient Falls * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (total)	2.00	1.581	5
Number of Unassisted Patient Falls * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (below $\bar{X}$)	3.76	3.113	17
Number of Unassisted Patient Falls * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (above $\bar{X}$)	2.82	2.359	11
Number of Unassisted Patient Falls * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	3.39	2.833	28
Number of Unassisted Patient Falls * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	3.67	3.055	3
Number of Unassisted Patient Falls * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (total)	3.25	2.630	4

(table continues)

Key Variables	M	SD	N
Number of Unassisted Patient Falls * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	3.67	.577	3
Number of Unassisted Patient Falls * Consulting Nurse Administrators (above $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (above $\bar{X}$)	3.67	1.966	6
Number of Unassisted Patient Falls * Consulting Nurse Administrators (below $\bar{X}$)* Practice Adjusted (total)* RN Forced to Come to Work (total)	3.88	2.998	17
Number of Unassisted Patient Falls * Consulting Nurse Administrators (total)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	3.88	2.998	17
Number of Unassisted Patient Falls * Consulting Nurse Administrators (total)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	3.20	2.781	10
Number of Unassisted Patient Falls * Consulting Nurse Administrators (total)* Practice Adjusted (below $\bar{X}$)* RN Forced to Come to Work (total)	3.63	2.884	27
Number of Unassisted Patient Falls * Consulting Nurse Administrators (total)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (below $\bar{X}$)	3.00	1.155	7
Number of Unassisted Patient Falls * Consulting Nurse Administrators (total)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (above $\bar{X}$)	2.63	1.506	8
Number of Unassisted Patient Falls * Consulting Nurse Administrators (total)* Practice Adjusted (above $\bar{X}$)* RN Forced to Come to Work (total)	3.67	3.049	18
Number of Unassisted Patient Falls * Consulting Nurse Administrators (total)* Practice Adjusted (total)* RN Forced to Come to Work (below $\bar{X}$)	3.67	3.049	18
Number of Unassisted Patient Falls * Consulting Nurse Administrators (total)* Practice Adjusted (total)* RN Forced to Come to Work (above $\bar{X}$)	3.12	2.205	17
Number of Unassisted Patient Falls * Consulting Nurse Administrators (total)* Practice Adjusted (total)* RN Forced to Come to Work (total)	3.40	2.648	35