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# A Quality Improvement Initiative to Enhance Nursing Teamwork: An Element of Excellence

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**Doctor of Nursing Practice: Practice Inquiry DNP project Defense and Approval**
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TITLE OF DNP PROJECT:
A Quality Improvement Initiative to Enhance Nursing Teamwork: An Element of Excellence

TEAM CERTIFICATION:
When the GVSU Registrar has on file that all other requirements have been met, we Certify that the candidate is eligible to receive the Doctor of Nursing Practice degree

Chairperson: Dr. Jean Barry — Jean Barry
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01/23/2017
KCON Associate Dean for Graduate Programs — Date

Table of Contents

## Abstract

Health care is changing at a rapid pace to meet the needs and expectations of consumers across the United States. The desire for improved quality of care while reducing costs has led to increased attention on team composition, relationships, and culture. There is growing evidence to support the importance of quality workplace relationships and teamwork (Brunetto et al., 2013). Research indicates a positive relationship between a culture of teamwork and quality performance measures in the health care setting (Meterko, Mohr, & Young, 2004).

Teamwork in the acute inpatient care nursing team deserves more attention (Kalisch, Lee, & Rochman, 2010). Evidence of the impact of nursing teamwork on staff satisfaction, patient satisfaction, inpatient falls, or staff perceptions of nursing teamwork was lacking at the unit level within a large health care system in the Midwest.

A dashboard of unit level nursing teamwork variables was created using nursing teamwork survey (NTS) results along with personal job satisfaction and perceptions of teamwork among nursing team members, patient satisfaction, and patient falls. Dashboard results were used to determine if an intervention to enhance nursing teamwork was needed.

The project found that a significant relationship between patient falls and nursing teamwork exists. Fifty percent of nursing units evaluated were not meeting the national benchmark for patient falls and could benefit from an intervention to enhance nursing teamwork. Dashboard results will be disseminated to nursing leadership at the large Midwestern health care system to facilitate recommendation of evidence-based teamwork interventions. Five themes emerged during the analysis of perceptions of teamwork collected through interviews with nursing staff and assisted in the creation of a potential evidence-based intervention. Themes were

consistent with The Big Five in Teamwork model by Eduardo Salas and colleagues (Kalisch, Lee, & Salas, 2010; Salas, Sims, & Burke, 2005).

**Key words:** *nursing teamwork; work environment*; *job satisfaction; patient satisfaction; falls*

A Quality Improvement Initiative to Enhance Nursing Teamwork: An Element of Excellence

In 2001, the Institute of Medicine [IOM] created a report titled *Crossing the Quality Chasm: A New Health System for the 21st Century* which urges a new solution for improving patient safety across the nation. The "health care delivery system has fallen far short in its ability to translate knowledge into practice and to apply new technology safely and appropriately" (IOM, 2001, p.1). To achieve a new health system that addresses the chasm in health care delivery and quality across the United States, six aims were identified: to provide safe, equitable, effective, patient-centered care in a timely and efficient manner. In the report, the IOM attributes part of the problem to organizations and health care providers working in silos, rather than as a team (IOM, 2001).

More recently, health care reform has created a national shift in focus on quality of care. As a part of the Affordable Care Act (ACA), the Centers for Medicare and Medicaid Services (CMS) have created a value-based program to provide incentive or punishment for quality outcomes (Bosko, Dubow, & Koenig, 2016). Value-based purchasing (VBP) provides a financial bonus for acute care institutions that meet performance measures in a variety of areas: process of care, outcomes, patient experience, and efficiency. Only 55% of the eligible hospital systems in the nation received a financial bonus under the VBP program in 2015 (Bosko, et. al 2016). This gives significance to the importance of VBP and the urgent need of acute care institutions to improve health care quality by examination of practices that impact quality.

Research indicates a positive relationship between quality performance measures and a culture of teamwork in the health care setting (Meterko et al., 2004). Teamwork is defined conceptually as "a group of two or more people working interdependently to achieve a common

goal" (Kalisch, Lee, & Salas, 2010). Alternate terms for teamwork include social integration, group cohesion, and synergy.

Social integration in nursing is important for a number of reasons: ensuring quality and safety, maintaining standards of professionalism, and affirming commitment to an organization. Research by Kramer and Schmalenberg (2004) identifies positive, collaborative peer relationships as an essential component of Magnet hospitals. Organizations that have achieved Magnet recognition consistently attract and retain nurses, and deliver excellent patient care (Kramer & Schmalenberg, 2004). In a cross-sectional study which utilized a sample of 698 nurses working on intensive care units across 8 Magnet hospitals, Schmalenberg and Kramer (2007) found that intensive care unit structures that supported teamwork, exemplified by respectful, caring relationships among nurses, resulted in job satisfaction and high-quality care for patients. Research by Van Bogaert et al. (2014) suggests that a link exists between nurses' job satisfaction and patient satisfaction (Van Bogaert et al., 2014).

Witges and Scanlon (2015) examined the concept of synergy and report that synergy within health care results in harmonious relationships among team members and high levels of productivity and performance measured by patient outcomes. It allows individuals to maximize skills and expertise by working interdependently to achieve a common goal. Kramer et. al (2008) and Salas, Burke, and Cannon-Bowers (2000) acknowledge that teams that are able to cultivate synergy experience greater professional growth, including empowerment, autonomy, and commitment to the organization. A high level of nursing teamwork was found to be related to lower mortality rates and vacancy rates (Kalisch, Labelle, & Boqin, 2013). In a concept analysis, the following were noted as consequences of teamwork supported by the literature: professional

growth among nurses, greater personal job satisfaction, and positive and cost effective outcomes (Witges & Scanlon, 2015; Xychris & Ream, 2007).

Many disciplines have recognized the importance of teamwork and its impact on health care quality (Zeltser & Nash, 2010). In nursing, Beatrice Kalisch has led the focus on the importance of teamwork. Teamwork in the acute inpatient care nursing team, is defined as "registered nurses (RN), nursing technicians (NT), and unit secretaries (US) who work together on a patient care unit to provide nursing care to patients" (Kalisch, Lee, & Rochman, 2010, p.939). Heightened teamwork has been linked to increased job satisfaction, promoting quality of care and greater patient satisfaction (Bratton, 2005; Kalisch, 2009; Kalisch, Lee, & Salas, 2010; Kalisch & Lee, 2011). Ineffective teamwork is associated with patient falls and nursing turnover, creating cost to health care organizations (Brewer, 2006; Kalisch, Curley, & Stefanov, 2007). A patient fall which requires additional inpatient care of the hospitalized patient results in an additional $18,590 in inpatient costs attributed to falling (Bohl, Phelan, Fishman, & Harris, 2012).

The nursing teamwork survey (NTS) has been developed to measure teamwork within a nursing work environment, specifically in the acute care hospital setting. It is a 33-item questionnaire developed by Beatrice Kalisch and colleagues in response to concerns that existing tools focused on teams in specific patient populations (example: geriatrics) or lacked validity and reliability (Kalisch, Lee, & Salas, 2010). Kalisch, Lee, and Salas (2010) used the Big Five in Teamwork model as a theoretical framework when creating the NTS. The Big Five in Teamwork model includes 5 core elements of teamwork: team orientation, team leadership, mutual performance monitoring, backup, and adaptability (Kalisch, Lee, & Salas, 2010; Salas, Sims, & Burke, 2005).

In 2015, the NTS was electronically sent to nurse managers, educators, clinical nurse specialists, registered nurses, nursing technicians, and unit secretaries on inpatient nursing units at a large health system in the Midwest. Despite use of the NTS in a large, western Michigan health care system, evidence of the impact of nursing teamwork on staff satisfaction, patient satisfaction, inpatient falls, or staff perceptions of nursing teamwork was lacking at the unit level within the organization of interest.

While the survey results had been shared with nurse administrators, there was a lack of knowledge translation of existing quantitative data to indicate if evidence-based initiatives were needed to improve the effectiveness of nursing teams. Additionally, other data sources had not been examined and synthesized along with the NTS data to create a robust evidence-based dashboard of nursing teamwork. Successful knowledge translation begins with a thorough understanding of the practice problem and supporting evidence. Effective implementation of evidence into practice is a function of the quality and type of evidence, in conjunction with appropriate setting and facilitation (Kitson & Harvey, 2016).

Therefore, thorough appraisal of current literature along with the quantitative NTS results was conducted for each unit at the organization of interest. Consequently, a project was executed to provide a dashboard of unit level nursing teamwork using NTS results along with personal job satisfaction among nursing team members, patient satisfaction, and patient falls. Furthermore, the dashboard will be reported to nursing leadership to facilitate recommendation of evidence-based teamwork interventions. Components such as job satisfaction, patient satisfaction, and patient falls were critical to examine in order to determine the impact of nursing teamwork at the unit level within the organization of interest. These components are critical because of their effect on staff retention, work performance, patient outcomes and health care costs.

## Problem Statement

Nursing teamwork has been identified as a topic of growing interest by key stakeholders within a large health care system in the Midwest. In the organization of interest, the Nursing Director of Orthopaedics and Neurosciences expressed interest in partnering with a doctoral student to conduct a thorough analysis of NTS results. The NTS results indicated that some units within orthopaedic and neuroscience services had overall teamwork scores that were lower than mean teamwork scores across the health care system. While this provided valuable information of nursing teamwork, it did not include evidence of the impact of nursing teamwork on patient satisfaction, inpatient falls, staff satisfaction, or staff perceptions of nursing teamwork. Therefore, the aim of the project was to provide a robust dashboard of unit level nursing teamwork. The dashboard includes an analysis of the influence of nursing teamwork on patient satisfaction, inpatient falls, and staff satisfaction to nursing leadership at the organization of interest to facilitate recommendation of evidence-based teamwork interventions.

## Evidence Based Initiative

Integration of best evidence found in the literature paired with clinical expertise is key to the process of evidence-based practice (Melnyk & Fineout-Overholt, 2015). A thorough literature review allows for individual research findings and reviews to be examined together with the purpose of providing a detailed overview of the topic. A literature review was conducted to identify, summarize, and synthesize the available literature on teamwork among nursing staff, including the benefits and challenges of effective teamwork in health care and the impact of interventions to enhance nursing teamwork.

**Impact of Nursing Teamwork**

The impact of nursing teamwork has been clearly identified in the literature. Common outcomes of enhanced teamwork among nursing staff can be placed in three categories: greater job satisfaction and patient satisfaction, in addition to fewer patient falls.

Job satisfaction is defined as an employee's positive feelings towards his or her work (Liu, Aungsuroch, & Yunibhand, 2015). In nursing, Mueller and McCloskey (1990) define nurses' job satisfaction as the "degree of positive affective orientation toward employment" (p.113). Teamwork, also termed group cohesion or synergy, is widely recognized as a component of job satisfaction (Kalisch et al., 2007). A study by Chang et al. (2009) found that improved teamwork was associated with greater job satisfaction. Collette (2004) and Amos, Hu, and Herrick (2005) report that a high level of nursing teamwork is associated with greater personal job satisfaction among team members.

In health care, job satisfaction is a predictor of patient care quality and safety (Aiken, Sloane, Bruyneel, Van den Heede, & Sermeus, 2013; Purpora & Blegen, 2015; Van Bogaert et al., 2014; You et al., 2013). Van Bogaert et al. (2014) hypothesized that nurse practice environment would impact job satisfaction and various patient outcomes. Frequency of patient falls, nosocomial infections, and medication errors were influenced by dissatisfaction among nurses. Additional findings in this study suggest a link between nurses' job satisfaction and patient satisfaction (Van Bogaert et al., 2014).

Patient satisfaction can be defined as the degree to which nursing care meets patients' expectations. It is believed to be determined by the art of care, technical quality, physical environment, availability and continuity of care, and the outcomes of care (Wagner & Bear, 2009). Because of the frequent contact to the patient and nature of the nurse-patient relationship,

nurses are believed to have a great impact on patient satisfaction (Ahmed, Shehadeh, & Collins, 2013). Valentine (1997) studied the relationship between nursing care and patient satisfaction. Nursing care and nurse attitudes strongly influenced patient satisfaction, indicating that patients' choices of where to seek health care were influenced by positive experiences with nursing care (Valentine, 1997). In a study of teamwork culture and patient experience, Meterko et al. (2004) found that patients are more satisfied with their care when teamwork is higher.

You et al. (2013) examined patient satisfaction using an adapted Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey which asks patients to evaluate their health care experience. Researchers examined the composite for communication with nurses along with the aggregate item, likelihood to recommend the hospital. In hospitals with a high proportion of satisfied nurses, patients are more likely to be satisfied with nursing communication and willingness to highly recommend the hospital (You et al., 2013). You et al. (2013) also reported that high levels of nurse satisfaction resulted in fewer reports of poor or fair patient care quality.

Quality of care can be measured in several ways. Patient falls are a well-known marker of quality within the United States health care system. The National Database of Nursing Quality Indicators (NDNQI) examined the relationship between nursing and quality outcomes (Garrard, Boyle, Simon, Dunton, & Gajewski, 2014). Varying definitions for patient falls exist; Agostini, Baker, and Bogardus (2001) define a patient fall as "unintentionally coming to rest on the ground, floor, or other lower level, but not as a result of syncope or overwhelming external force".

Nursing teams are known to influence nurse–sensitive patient outcomes (example: patient falls) (You et al., 2013). Research documents the significant impact that patient falls have on

patients and health care organizations due to extended length of stay and preventable surgery (Godlock, Christiansen, & Feider, 2016; Williams, Szekendi, & Thomas, 2014). Griffiths and associates (2008) appraised measures of nursing care related to patient care. Numerous studies have documented the influence of nursing care on patient falls (Griffiths, Jones, & Maben, 2008). Godlock et al. (2016) implemented a team-based intervention to determine if nursing staff education and teamwork contributed to the incidence of patient falls on a medical nursing unit. The patient fall rate decreased after implementation of a team-based intervention which focused on closed loop communication, leadership, situation monitoring, and mutual support (Godlock et al., 2016).

Kalisch and associates (2007) found that an intervention to enhance teamwork and staff engagement led to a significant decrease in patient falls and staff turnover. Patients that reported overall quality of care as "excellent" increased from 46% to 52% after implementation of an initiative to increase nursing teamwork (Kalisch et al., 2007). In an investigation of relationships among team members, patient safety, and cost outcomes Brewer (2006) reported that a culture of teamwork was found to predict fewer patient falls with injury.

Collectively, the evidence suggests that satisfaction among nurses is critical to maintain a healthy work environment and quality care. Quality of care is noted as increased patient satisfaction and decreasing patient fall rates. Furthermore, nurses' job satisfaction is positively influenced by teamwork. Different methods have successfully been utilized to achieve improved teamwork, including simulation and electronic learning.

Kalisch, Aebersold, McLaughlin, Tschannen, and Lane (2015) researched the influence of an intervention to enhance teamwork. Authors utilized the Salas and colleagues teamwork model to guide implementation of a 1-hour virtual simulation intervention for nursing staff at an

acute care institution (Kalisch et al., 2015). The Salas and colleagues teamwork framework identifies five core components of teamwork: team leadership, team orientation, mutual performance monitoring, backup, and adaptability (Kalisch et al., 2015; Salas et al., 2005). Utilizing the NTS, study results indicate improved teamwork in three teamwork subscales (trust, team orientation, and backup) after the implementation of a virtual simulation. Cohen's effect size, or the measure of strength and correlation between two items, demonstrates that the intervention had a large ($d=0.96$) and statistically significant ($p<0.012$) effect on overall teamwork using the NTS and Teamwork Knowledge Survey (Kalisch et al., 2015).

**Measurement Tools**

Data measurement provides an opportunity to offer further insight into the phenomenon of nursing teamwork. Various measurement tools exist for evaluating the impact of nursing teamwork. Each tool has been tested for psychometric soundness and importance.

The 33-item NTS uses a 5-point Likert-scale (1= very dissatisfied/rarely, 2= dissatisfied/25% of the time, 3=neutral/50% of the time, 4=satisfied/75% of the time, 5=very satisfied/always). Kalisch, Lee, and Salas (2010) conducted a confirmatory factor analysis to test the hypothesis that a relationship between observed nursing teamwork survey subscales and their underlying construct, The Big Five in Teamwork model, exists. From the statistical technique, confirmatory factor analysis, two variables were removed: mutual performance monitoring and adaptability. These variables were replaced by shared mental models and trust.

The items within the NTS are integrated into 5 subscales that align with the Big Five in Teamwork model: trust (7 items), team orientation (9 items), backup (6 items), shared mental model (7 items), and team leadership (4 items). The survey also contains questions about demographic characteristics of respondents (Kalisch, Lee, & Salas, 2010).

A study by Kalisch, Lee, and Salas (2010) assessed the acceptability, validity, and reliability of the NTS. Of the 1,758 respondents in the study, 80.4% completed the instrument without omitting any items. The questionnaire was completed by most participants in 10 minutes or less. These findings establish acceptability of the NTS. The extent that the scale provides data relative to commonly accepted meanings of teamwork, or validity, was established with examination of content validity, concurrent validity, and convergent validity. Content validity for the NTS was established by a panel of experts (Kalisch, Lee, & Salas, 2010).

Concurrent validity of the NTS was examined using confirmatory factor analysis, which includes comparative fit index, root mean square error of approximation, and standardized root mean square residual. Using these tests, the concurrent validity or the extent to which the results correspond to the results of a previously established measure of the same construct, was established ($r = 0.633$, $p < 0.001$).

Convergent validity is measured by testing different measures of the same construct (Kalisch, Lee, & Salas, 2010). Correlation of the teamwork subscale within the NTS against the Safety Attitudes Questionnaire (SAQ) established convergent validity ($r = 0.76$, $p < 0.01$). Test-retest reliability using one-way ANOVA was utilized to examine reliability of the NTS. Test-retest coefficients ($r$) for each subscale ranged from 0.77 to 0.87, and the overall test-retest coefficient for the NTS was 0.92 demonstrating reliability. Overall internal consistency measures for the NTS were 0.94, while internal consistency measures for subscales ranged from 0.74 to 0.85 (Kalisch, Lee, & Salas, 2010).

**HCAHPS**

The *HCAHPS Three State Pilot Study Analysis* explored the development and testing of a standard survey instrument, HCAHPS, to collect and report information on patients' perspectives

on the care they received during their hospital stay (CAHPS II Investigators, 2003). Specific to the proposed project, this study identified that the "communication with nurses" composite had the strongest relationship to the global rating of care from nurses and willingness to recommend the hospital to family and friends. The overall "communication with nurses" composite score is derived from 3 questions related to the nurses' ability to explain things in a way that the patient could understand, listening skills, and respectfulness.

The survey uses a 4-point Likert-scale (1= never, 2= sometimes, 3=usually, 4=always) where each response is an ordinal variable, however, the composite score is a continuous variable. The "communication with nurses" composite exhibited a Cronbach's alpha coefficient of 0.85 which demonstrates internal consistency reliability. Analysis of the results from the pilot study across 85 hospitals in three states allowed the HCAHPS instrument to be reduced to a 32-item survey.

Results of the study support the reliability and construct variability of the survey (CAHPS II Investigators, 2003). In hospitals with a high proportion of satisfied nurses, patients were more likely to be satisfied with nursing communication and willingness to highly recommend the hospital (You et al., 2013). The scholarly project utilized the "communication with nurses" composite to measure patient satisfaction.

**Patient Falls**

The National Database of Nursing Quality Indicators (NDNQI) examines the relationship between nursing and quality outcomes (Garrard et al., 2014). The NDNQI defines a patient fall as "an unplanned descent to the floor with or without injury to the patient" (Agency for Healthcare Research and Quality, 2013). This definition parallels the definition used in this

project, which is “unintentionally coming to rest on the ground, floor, or other lower level, but not as a result of syncope or overwhelming external force”.

One study examined the composite related to falls with injury within the National Database of Nursing Quality Indicators (NDNQI) report. The item was tested using a Fall Level Injury survey from the National Quality Forum (NQF), which asked participants to classify several different fall scenarios to determine validity and reliability of the NDNQI subscale item related specifically to falls with injury (Garrard et al., 2014). The intra-class correlation coefficient (ICC) is often used as a determinant of reliability. Authors of the study calculated ICC as the proportion of the total variance that is due to the true variance from raters. Garrard et al. (2014) found an overall ICC of 0.85 which is noted as “good” or “very good” by commonly accepted guidelines. From the study, the item related to falls with injury within the NDNQI questionnaire was found to be reliable, or able to produce similar results under similar conditions when repeatedly measured.

Validity of the NDNQI measure was confirmed with use of factor analysis. Authors propose that study findings can be utilized to assist in future quality improvement efforts to determine potential predictors and of falls among hospitalized patients, similar to this nursing teamwork scholarly project. The influence of nursing care on health care quality and incidence of patient falls is well-documented (Griffiths et al., 2008). The scholarly project and teamwork initiative utilized the definition of fall rate as measured by NDNQI as one fall per one-thousand patient days.

**Staff Satisfaction**

The Gallup $Q^{12}$ survey focuses on the relationship between employee engagement and business outcomes. The $Q^{12}$ survey utilizes a 5-point Likert-scale (1=extremely dissatisfied,

2=dissatisfied, 3=neutral, 4=satisfied, 5=extremely satisfied) to measure overall staff satisfaction with the company as a place to work, along with an additional 12 items to measure the extent of staff engagement. Harter, Schmidt, Killham, and Asplund (2006) conducted a meta-analysis of 166 studies that included Gallup's $Q^{12}$ survey to determine the strength of effects of employee engagement and their generalizability. From the studies reported, authors found that correlations were positive and generalizable between profitability, productivity and staff engagement. Further analysis indicates that the Gallup $Q^{12}$ to be reliable and valid (Harter et al., 2006). Within the Gallup $Q^{12}$, overall satisfaction is queried by Q00: "*How satisfied are you with your organization as a place to work*" (Harter et al., 2006). The overall satisfaction item within the Gallup $Q^{12}$ survey was utilized to measure satisfaction among nursing staff in the scholarly project. For data analysis, this item was considered an ordinal variable.

The preponderance of evidence affirms that teamwork is directly or indirectly associated with satisfaction among team members, level of patient satisfaction, along with care quality and patient safety (Kalisch et al., 2007; Kalisch, Labelle et al., 2013; Kalisch, Lee, & Rochman, 2010; Kalisch, Weaver, & Salas, 2009; Xychris & Ream, 2007). Enhanced patient safety through implementation of teamwork initiatives has been well-documented in the literature (Barrett, Gifford, Morey, Risser, Salisbury, 2001; Jain, Miller, Belt, King, & Berwick, 2006; Kalisch, Xie et al., 2013).

Reliable tools exist for measurement of the impact of nursing teamwork in the acute, inpatient care environment. Existing evidence supports the need for further attention on nursing teamwork in the acute, inpatient care setting. In an effort to improve outcomes and increase knowledge of nursing teamwork in orthopaedics and neurosciences in the acute care setting of a large, Midwestern health care system, an initiative to incorporate literature findings with

evidence from the NTS was conducted. This initiative was in alignment with the organizational assessment and was feasible to implement.

## Conceptual Models

### Implementation Model

Conceptual models allow individuals to better understand a subject or a process. A conceptual model is needed in any quality improvement initiative to guide the process of implementation. The Institute of Health and Improvement [IHI] (n.d.) Plan, Do, Study, Act model was chosen to guide the implementation of the nursing teamwork initiative. This model was chosen based on its fit in meeting the intended aim of the scholarly project and on its successful use in previous quality improvement projects (Jacelon, Macdonald, & Fitzgerald, 2014). Appendix A provides an illustration of the IHI PDSA model. Three foundational questions frame the cyclic model and are used to set aims, establish measures, and select the appropriate change. The cyclic nature of the PDSA model allows for ongoing modification and improvement. Modifications can be performed in response to new, additional information, unforeseen barriers, or organizational needs.

The IHI PDSA includes four phases to successful implementation: plan, do, study, and act. The first phase in the process is planning, which includes identifying, collecting, and analyzing pre-implementation data to effectively plan project. In the plan phase, project investigators must determine who will be included as members of the team, the objective and scope of the project, and data collection tools and measurement. The next phase, “do”, allows the team to carry out the plan. This phase focuses on data collection if a new or revised process is introduced and making adjustments to close gaps during analysis. In the third phase project, “study”, investigators evaluate the effectiveness of the change by studying the outcomes. Act is

the final phase of the PDSA cycle. In this phase, investigators are charged with refining the change based on results (IHI, n.d.).

The IHI PDSA model guides the process for quality improvement initiatives. It has been effectively used in quality improvement projects in the past (Jacelon et al., 2014). Each phase within the model focuses on attempts for continuous improvement to meet organizational needs and improve the quality of care. The IHI PDSA model will serve as a framework to guide implementation of the proposed project, as well as a compliment to the theoretical model.

**Theoretical Model**

A theoretical framework provides a broad context to best understand a phenomenon of interest. The Big Five in Teamwork framework was selected to underpin the phenomenon of interest, nursing teamwork, and its supporting concepts and propositions. Unlike other teamwork frameworks, the model developed by Salas, Sims, and Burke (2005) provides a comprehensive, practical definition of teamwork effectiveness, rather than teamwork composition. The framework was selected for its explicit definitions of concepts and its application to teamwork in nursing. An illustration of the Big Five in Teamwork framework can be found in Appendix B.

Salas and colleagues (2005) define teamwork as "two or more individuals with specified role interacting adaptively, interdependently, and dynamically toward a common and valued goal" (p.562). This description of teamwork aligns with the definition of teamwork in nursing, which is: "registered nurses (RN), nursing technicians (NT), and unit secretaries (US) who work together on a patient care unit to provide nursing care to patients" (Kalisch, Lee, & Rochman, 2010, p.939). The Big Five in Teamwork framework includes 5 interdependent concepts: team leadership, mutual performance monitoring, backup behavior, adaptability, and team orientation.

These five concepts are supported by 3 coordinating mechanisms. The coordinating mechanisms are shared mental models, closed-loop communication, and mutual trust. Shared

mental models can be defined as a collective understanding of the environment and expectations of individual performance. This includes understanding of team goals, individual team member tasks, and the coordination of the team to achieve common goals to provide purpose to the team.

The second coordinating mechanism, closed-loop communication, allows for facilitation of the teams' shared mental models. It is defined as the distribution of communication among individuals with an intentional acknowledgement that the message was received and accurately understood. Mutual trust is the final coordinating mechanism. Mutual trust is described as a shared perception among individuals that each team member will take action to achieve a task that benefits and protects the interests of all team members. Each of the coordinating mechanisms supports the 5 concepts (team leadership, mutual performance monitoring, backup behavior, adaptability, and team orientation) to facilitate collaboration of tasks and ensure success (Salas, et. al, 2005).

The Big Five in Teamwork provides a theoretical framework to understand the concept of nursing teamwork in the acute, inpatient care setting. The 5 dimensions or concepts (team leadership, mutual performance monitoring, backup behavior, adaptability, and team orientation) within the framework are clearly defined and have supporting mechanisms (shared mental models, closed-loop communication, and mutual trust) to provide practical application and ensure team effectiveness.

Kalisch, Lee, and Salas (2010) used the Big Five in Teamwork model as a theoretical framework when creating the nursing teamwork survey (NTS). The NTS and the Big Five in Teamwork model have been effectively utilized at the organization of interest in the past. Leaders within the large, Midwest health care system are familiar with the framework and have selected the model to guide the implementation of the institution-wide teamwork initiative. In

this scholarly project, the Big Five in Teamwork steered the methodology of data analysis to gain a deeper understanding of each of the NTS subscales. It allowed stakeholders to better understand what each subscale indicates.

## Need and Feasibility Assessment of Organization

The organization of interest is a Midwestern health care system which includes twelve tertiary care facilities in the region, an insurance company, and a multispecialty medical group of providers. This organization serves as one of the largest employers in the region, which hosts over twenty-five thousand employees. As a system, the organization has won hundreds of awards for quality and excellence.

As a progressive leader in health care in the region, the organization has identified nursing teamwork as a priority in the most recent strategic plan. Part of the existing focus on teamwork includes the electronic administration of the nursing teamwork survey (NTS) to nurse managers, registered nurses, nursing technicians, educators and clinical nurse specialists, along with unit secretaries on inpatient units across the organization as means to identify the level of nursing teamwork. The NTS was electronically sent to participants in May of 2015.

In the Midwestern health care system, the Nursing Director of Orthopaedics and Neurosciences expressed interest in partnering with a doctoral student to conduct a thorough analysis of NTS results. Results of the NTS reported that units within orthopaedic and neuroscience services had overall teamwork scores that were lower than mean teamwork scores across the health care system. While this provided valuable information of nursing teamwork, it did not include evidence of the impact of nursing teamwork on critical components (example: staff satisfaction, job satisfaction, and patient falls) which have the potentials to affect staff retention, work performance, and health care costs.

Transitions in health care policy and reimbursement force health care systems to be nimble in all areas of practice. Leaders within the identified organization supported the scholarly project because of its timeliness and clear alignment with the mission, values and vision of the organization. The project aim was relevant to organizational strategic goals and has potential sustainability for future quality initiatives.

## Project Plan

As mentioned earlier, the PDSA framework by the Institute of Healthcare for Improvement (n.d.) guided the development of the unit level nursing teamwork dashboards. The first phase, plan, is achieved by the creation of objectives of the project, adapted to the needs of the organization and nursing leadership. The identification, collection, and analysis of pre-implementation data to effectively plan the project is also included in the first phase of the project. The next phase, do, included carrying out the plan to construct a robust dashboard of nursing teamwork and evidence-based recommendations. The study phase encompassed the examination of results to determine that an increase in knowledge of current nursing teamwork was achieved. Act is the final phase and included the utilization of the knowledge of teamwork and recommendations.

### Purpose of Project with Objectives

The purpose of this project was to develop a robust dashboard of teamwork to evaluate nursing teamwork within inpatient orthopaedics and neurosciences in the identified health care organization. Objectives of the project were: (a) appraise and organize data pertinent to nursing teamwork in the acute, inpatient setting including level of nursing teamwork, patient satisfaction and fall rates, staff satisfaction, and staff perception of teamwork, (b) formulate a comprehensive data-driven dashboard of unit level nursing teamwork, and (c) propose evidence-based

recommendations tailored to the needs of the organization and nursing leadership, based on dashboard findings. Nursing leadership within the identified organization along with the doctoral student anticipated that the project would increase awareness of nursing teamwork within orthopaedics and neurosciences and identify possible interventions, if needed.

**Type of Project**

Quality improvement has been described as making changes that will result in improved patient outcomes, system performance, and professional development (Batalden & Davidoff, 2007). The initiative to analyze data and prepare a unit level dashboard of nursing teamwork was deemed a quality improvement project.

The scholarly project incorporated methods to appraise and organize data that are a direct and indirect reflection of performance, which impacts quality and outcomes. Utilization of data to determine the impact on patient care quality and outcomes to develop tailored evidence-based recommendations is anticipated to initiate action to improve the level of nursing teamwork, resulting in quality improvement. A change of performance and enhanced professional development is expected as a result of having an increased awareness of teamwork among nurses.

**Setting and Needed Resources**

The doctoral scholarly project was completed in a large, Midwestern not-for-profit health care system. As described earlier, the organization includes a hospital group, medical group, and insurance provider. The project scope was limited to orthopaedics and neurosciences in the inpatient, acute care setting.

The resources needed to complete the creation of a robust dashboard of unit level nursing teamwork variables included access to data elements and partnership with a statistician and data

analyst. Specific data elements needed were the nursing teamwork survey (NTS) results, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), National Database of Nursing Quality Indicators (NDNQI), and Gallup $Q^{12}$ scores for satisfaction.

The project also required the doctoral student to have access to an electronic database of literature to further unfold the current state of science as it related to initiatives to enhance teamwork. Time and physical space were needed to conduct data analysis and to prepare the dashboard and recommendations. Other resources included the agreement of staff to participate in sharing their perceptions of nursing teamwork and the guidance and mentorship of the faculty project advisor/chair along with the organization mentor/preceptor and additional faculty members.

**Design for the Evidence Based Initiative**

The scholarly project followed the IHI PDSA framework for quality improvement projects. As mentioned, steps within the framework include: plan, do, study, and act (Appendix A). The framework was selected because of applicability to the doctoral project and demonstrated success in previous quality improvement initiatives (IHI, n.d.; Jacelon, et al., 2014). The project was designed by the doctoral student with input from the faculty project advisor/chair, project team members, and nursing leadership within the organization. The selected design met the needs and desires of the identified organization, which was to increase awareness of nursing teamwork within orthopaedics and neurosciences while remaining nimble. Available resources, like access to data and input from human resources, were measured and incorporated in the design of the doctoral project.

The first phase is the IHI PDSA framework is planning, which included identification of data elements to effectively plan the project. A thorough literature review was conducted as a

portion of the planning phase to best understand the significance of the problem and the impact of specific data variables. The evidence revealed a relationship between level of nursing teamwork and patient satisfaction, patient fall rates, and job satisfaction among nursing staff. The nursing teamwork dashboard included information about nursing teamwork at the unit level based on NTS data and scores for patient falls, along with patient and staff satisfaction. Data from the NTS, HCAHPS, NDNQI fall rates, and Gallup $Q^{12}$ survey were appraised for added importance to the profile. Data from informal interviews during rounds with nursing staff were collected by the doctoral student to gain additional current information about staff perceptions of nursing teamwork.

The next phase in the framework, do, is defined as the implementation of the plan. The aforementioned data were examined and integrated into the dashboard. From the informal interviews, a thematic analysis was performed to identify unit-specific themes across units within orthopaedic and neuroscience services. Each dashboard addressed facilitators and barriers to nursing teamwork for each unit by highlighting the specific behaviors and nuances that impact teamwork. The doctoral student provided a unit level analysis and service-line analysis to differentiate strengths and weaknesses of teamwork among nursing staff.

In the third phase of project design, study, the project leader evaluated the effectiveness of the project by studying the outcomes gleaned from the various data sources. Outcomes of the dashboard were evaluated in order to increase knowledge of nursing teamwork within orthopaedics and neurosciences.

Additional objectives were created to give clarity to the aim of the teamwork dashboard. Objectives for the dashboard of nursing teamwork included: (a) define nursing teamwork and describe its significance, (b) report the overall level of nursing teamwork and level of each

subscale within the NTS (trust, backup, team orientation, shared mental models, and team leadership) for each unit, (c) describe unit level nursing teamwork, specifically as it relates to patient satisfaction and falls, and staff satisfaction, (d) interpret data findings to ascertain differences in teamwork across inpatient units within orthopaedics and neurosciences, (e) following analysis of data, construct tailored evidence-based recommendations, adapted to unit-specific strengths and weaknesses of nursing teamwork.

The project incorporated a report of recommended evidence-based interventions. The recommendations utilized evidence from the literature in conjunction with information gathered from the unit level dashboard of nursing teamwork.

Act is the final phase of the PDSA cycle and incorporates refinement of the project based on results. For the teamwork initiative, the act phase can be defined as dissemination of unit level teamwork dashboards and proposed evidence-based recommendations.

**Participants**

The participants in the scholarly project included any nurse manager, registered nurses, educator or clinical nurse specialist, and unit secretary that completed the NTS and identified an inpatient orthopaedic or neuroscience unit as the location where they work the most hours in a week. In addition, any nurse manager, registered nurse, educator or clinical nurse specialist, and unit secretary currently employed on an inpatient orthopaedic or neuroscience unit in the large, Midwestern health care organization could participate by voluntarily sharing his or her perception of nursing teamwork in the form of an informal interview while the doctoral student rounded on the unit.

**Measurement: Sources of Data and Tools**

The data measurements selected reflect current literature and the objectives of the project. Objectives of the project were: (a) appraise and organize data pertinent to nursing teamwork in the acute, inpatient setting including level of nursing teamwork, patient satisfaction and fall rates, staff satisfaction, and staff perception of teamwork, (b) formulate a comprehensive dashboard of unit level nursing teamwork, and (c) propose evidence-based recommendations tailored to the needs of the organization and nursing leadership, based on profile findings. Therefore, the data sources and measurements selected were:

- NTS: level of nursing teamwork, measured as the mean of teamwork subscale items (trust, backup, team orientation, shared mental models, and team leadership)
- HCHAPS: patient satisfaction, measured using the *Communication with Nurses* composite score. The composite score is derived from 3 questions related to the nurses' ability to explain things in a way that the patient could understand, listening skills, and respectfulness.
- NDNQI: inpatient fall rate, defined by Agostini, Baker, and Bogardus (2001) as "unintentionally coming to rest on the ground, floor, or other lower level, but not as a result of syncope or overwhelming external force". This is measured as one unplanned descent to the floor with or without injury to the patient per one thousand patient days.
- Gallup $Q^{12}$: staff satisfaction, measured using *Q00. How satisfied are you with your organization as a place to work?*
- Informal interview: staff perceptions of nursing teamwork, evaluated by thematic analysis of interview response results

Each measurement tool was identified using evidence within the literature review which was conducted within the plan phase of the PDSA cycle. Outcomes of the dashboard were measured by increased knowledge of nursing teamwork within orthopaedics and neurosciences services.

**Steps for Implementation of Project, including Timeline**

Steps for implementation of the project are identified below. A timeline for implementation of the teamwork initiative is shown in Table 1.

| Timeline → / Task ↓ | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 | Day 8 | Day 9 | Day 10 | Day 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gain Access to Data Elements: NTS, Gallup Q12, NDNQI, & HCAHPS | | | | | | | | | | | |
| Meet with staff at Statistical Consulting Center | | | | | | | | | | | |
| Perform Statistical Analysis: Pearson Chi-Square & Odds Ratio & Cross-Tabulation | | | | | | | | | | | |
| Data Collection: Informal Interviews in Orthopaedics & Neurosciences | | | | | | | | | | | |
| Perform Thematic Analysis | | | | | | | | | | | |
| Determine the Need for Interventions to Enhance Nursing Teamwork | | | | | | | | | | | |
| Construct Recommendations of Tailored Interventions | | | | | | | | | | | |
| Evaluation of Outcomes | | | | | | | | | | | |

*Table 1*. Implementation Timeline

A critical step prior to implementation was the assessment of the organization. Successful translation of evidence begins with a thorough organizational assessment (Dadich & Hosseinzadeh, 2013; Graham, et. al, 2006). An organizational assessment provides an understanding of the feasibility of evidence-based change implementation and organizational readiness for change by identifying facilitators and barriers within the organization (Graham, et. al, 2006). It also provides information about the culture and ethical climate of the organization, along with its fit in the macro environment. In the planning stage, an organizational assessment

was conducted and it was determined that the doctoral scholarly project met the needs and desires of leaders within the identified organization. It was also determined that the organization has appropriate resources to support the project.

Next, the practice problem was defined and the potential impact on health care was better understood. The practice problem, defined as a lack of translation of evidence to support enhanced nursing teamwork, was determined in the plan phase of the PDSA cycle.

Implementation of the project was carried out in the second phase, do, of the PDSA model. The first step in implementation of the project was the assurance of the availability of data sources, including NTS results, HCAHPS scores, NDNQI, and Gallup $Q^{12}$ ratings. Data elements were based on previous studies that identified a relationship between level of nursing teamwork (NTS) and patient satisfaction (HCAHPS), fall rates (NDNQI), staff satisfaction (Gallup $Q^{12}$), and staff perception of teamwork (informal interviews). For the purposes of this project, informal interviews were essential to establish an understanding of current nursing teamwork and its impact based on a myriad of reliable data sources.

Successful implementation of the proposed project began with gained access to the NTS data. The doctoral student requested a query to all relevant data, including the NTS results for the inpatient orthopaedic and neurosciences units. Although individual, personal information was not collected during the completion of the NTS, the NTS results were coded to maintain anonymity of subjects. Therefore, the doctoral student partnered with the principal investigator of the NTS research study to obtain the correct unit level NTS results. The NTS results provided the doctoral student with demographic data, along with the overall level of nursing teamwork and subscale (trust, team orientation, backup, shared mental model, and team leadership) findings for each inpatient unit within orthopaedics and neuroscience services.

Access to the HCAHPS scores, specifically results of the *Communication with Nurses* composite score, along with access to the inpatient fall rate measured by one fall per one-thousand patient days from the NDNQI portal, was achieved. The sample size for HCAHPS responses ranged from ranged from 42 responses to 141 responses for each question within the three-question composite (unit 1: n=47; unit 2: n=108; unit 3: n=132; unit 4: n=42; unit 5: n=78; unit 6:n=141). Sample size for patient falls ranged from 0 falls and 583 patient days to 4 falls and 1018 patient days (Appendix E). The Gallup $Q^{12}$ results for *Q00. How satisfied are you with your organization as a place to work?* was made available to the doctoral student as well. Sample size for Gallup Q12 ranged from 28 respondents to 61 respondents (unit 1: n=39; unit 2: n=48; unit 3: n=28; unit 4: n=45; unit 5: n=47; unit 6: n=61). Participation ranged from 28% to 84% of nurses. To coincide with the administration and completion of the NTS, the May 2015 data measurements from each of the aforementioned sources was utilized.

In addition to collection of quantitative data, the doctoral student performed frequent rounds on the unit to gather informal responses to better understand the perception of nursing teamwork among nurse managers, educators and clinical nurse specialists, registered nurses, nursing technicians, and secretaries. Participation in informal interviews was voluntary and occurred during the participants regularly scheduled shift. The participants' responses were recorded; however, no personal identifiers were attached to the information. Participants had the opportunity to request that the informal interview happen in a separate location or at an alternate time if patient care would have been disrupted, however, zero staff members made this request.

To protect contributors, each participant was required to sign a consent (Appendix D). At the onset of each discussion, the interviewer reviewed the key points about participation in the interview. The key points included the ability to opt out, a reminder that results will only be

presented in aggregate unit level form for their protection and that their privacy will be protected. Participants could refuse to contribute to the informal interview without penalty, however, zero staff members refused when asked to participate. When data saturation was achieved, the interviewer stopped future interviews. A total of 47 interviews of were conducted (23 nurses, 11 nursing technicians, and 5 nurse managers). A minimum of 30% participation was met on each unit. Thematic analysis of the all interview responses and content was performed.

Once access to all relevant data was gained, the doctoral student partnered with a statistician and data analyst from the Grand Valley State University Statistical Consulting Center (SCC). A primary statistical question was whether the sample size was sufficient to conduct comparative analyses in the form of a t test. Also, results from the quantitative data analysis were visually organized using various quality improvement tools, such as bar graphs and pie charts.

Statistical and thematic analysis of NTS, HCAHPS, NDNQI, Gallup $Q^{12}$, and informal interview response data were compared against the unit level aggregate to determine units that have high and low scores of nursing teamwork and the scores from the other data sources. High and low scores were determined based on whether or not the score met national metrics for like-units (example: patient falls). If a national metric was not used, the data were scored as high or low when compared to the average score within the service line (example: job satisfaction or overall nursing teamwork). Nursing units with low scoring teamwork with significant impact on staff satisfaction and patient outcomes were the focus of evidence-based recommendations. These recommendations built on the identified strengths and weaknesses for each unit discovered in the development and construction of the teamwork dashboard. Recommendations reflect current state of science as it relates to nursing teamwork.

Based on the data analysis, a robust unit level dashboard of nursing teamwork was created. Content within the dashboard was based on the objectives created. Objectives for the dashboard of nursing teamwork included: (a) define nursing teamwork and describe its significance, (b) report the overall level of nursing teamwork and levels of subscales within the NTS (trust, backup, team orientation, shared mental models, and team leadership) for each unit, (c) discuss the impact of unit level nursing teamwork, specifically as it relates to patient satisfaction and falls, and staff satisfaction, (d) interpret data findings to provide a comparison of teamwork among nursing staff across each inpatient unit within orthopaedics and neurosciences, (e) examine current practices and relate to data to construct tailored evidence-based recommendations, adapted to unit-specific strengths and weaknesses of nursing teamwork as indicated by the results from the NTS.

The teamwork dashboard for each unit was packaged in a binder to serve as a visual aid and product to present to nursing leadership. Results of the analysis and evidence-based recommendations will be presented to nursing leadership within orthopaedics and neurosciences. To increase attendance at the presentation, the presentation will occur at a regularly scheduled leadership meeting. Nursing leaders will assist in evaluation of the project by providing recommendations for expansion and sustainment of the project, as well as appraisal of the evidence-based initiatives. This portion of the project is supported by the third step in the PDSA mode, study.

**Project Evaluation Plan, including Data Analysis**

The project evaluation plan was introduced in the steps for implementation section of this paper. The scholarly project was evaluated based on meeting the objectives. Objectives of the project were: (a) appraise and organize data pertinent to nursing teamwork in the acute, inpatient

setting including level of nursing teamwork, patient satisfaction and fall rates, staff satisfaction, and staff perception of teamwork, (b) formulate a dashboard of unit level nursing teamwork, and (c) propose evidence-based recommendations tailored to the needs of the organization and nursing leadership, based on dashboard findings.

More specifically, the first objective of the project: appraise and organize data pertinent to nursing teamwork in the acute, inpatient setting including level of nursing teamwork, patient satisfaction and fall rates, and staff satisfaction was evaluated using an evaluation tool (Appendix E). This objective was met because the tool was completed and the appropriate statistical analyses were performed. The completed tool can be found in Appendix E.

The second objective was completed through thematic analysis and with the assistance of statistical consultants at the Grand Valley State University Statistical Consulting Center (SCC). Six dashboards or profiles of unit level teamwork among nurses within orthopaedics and neurosciences were created. Verbal outcome evaluation with nursing leadership will be utilized to assess program effectiveness in meeting the second objective: formulate a comprehensive dashboard of unit level nursing teamwork. The completion of a robust thematic analysis of the informal interview results served as a marker of success. The second objective was met when the Director of Orthopaedics and Neurosciences determined that each dashboard of unit level nursing teamwork was completed and was comprehensive.

Nursing leadership within the identified organization along with the doctoral student expected that the project would increase awareness of nursing teamwork within orthopaedics and neurosciences. In addition to the presentation of teamwork dashboard and evidence-based recommendations (the final objective), a verbal evaluation of awareness of teamwork will be

completed to determine if there was an increase in awareness of teamwork while working on the teamwork project and initiative.

The project was deemed successful because the doctoral student and stakeholders within the organization of interest determined that the project is valuable to nursing staff and leadership. Value was evaluated by increased understanding of teamwork and its impact on unit level outcomes, awareness of variables directly or indirectly related to nursing teamwork, and knowledge of potential initiatives to influence unit level outcomes related to nursing teamwork.

**Ethics and Human Subjects Protection**

There was limited human contact in the doctoral scholarly project; however, protection of human subjects must still be considered. Data collection from the nursing teamwork survey (NTS) was de-identified to protect participants. Responses gathered from informal interviews were not linked to participants, but rather, was appraised by unit level aggregate information by virtue of a thematic analysis. There was no financial compensation or incentive for nurse managers, registered nurses, nursing technicians, educators or clinical nurse specialists, secretaries, or the organization for participation in the scholarly project and teamwork initiative. An application for Institutional Review Board (IRB) determination was submitted to the Human Research Review Committee (HRRC) at Grand Valley State University and the IRB within the large, Midwestern health care organization. Each IRB evaluated the project design to ensure that the initiative met federal, institutional, and ethical guidelines for protection of human subjects. The HRRC determined that the project was a quality improvement initiative, rather than research (Appendix C). Qualifications for a non-research project comprise the exclusion of: "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge" (Research Protections Program, 2016).

**Budget**

The project did not require financial support. The approved use and administration of the NTS was part of a larger research project at the health care system in the Midwest. No additional cost was incurred from the use of the previously collected NTS data and/or other data sources.

Other resources needed for the completion of the project included human resources and time. Human resources included the doctoral student, statistician and data analysts, a PhD-prepared nurse and members of the HRRC along with nursing staff and leadership at the organization of interest. Each resource provided his or her time and skill to review and implement the project. The statisticians provided recommendation of appropriate statistical tests and analyses to achieve the desired outcome. In addition, the statisticians and data analysts assisted the doctoral student in data entry and analysis.

A PhD-prepared nurse and faculty member at Grand Valley State University was able to review the proposal and make recommendations for the pursuit of IRB approval. The HRRC at Grand Valley State University and the medical center methodically studied the application and project proposal, formulating feedback and determination of the project as a non-research, quality improvement initiative. Nurse managers, registered nurses, educators, and clinical nurse specialists provided his or her perception of unit level teamwork during project implementation to supplement the completion of the NTS. The Director of Nursing for Orthopaedics and Neurosciences was responsible for review of the project plan and partial determination of the feasibility of the potential evidence-based recommendations. Additional resources needed for the completion of this project included the space and statistical software to complete the data analysis.

## Project Outcomes

The scholarly project examined the relationship between (a) overall nursing teamwork and personal job satisfaction, (b) overall nursing teamwork and patient satisfaction, and (c) overall nursing teamwork and fall rates between six different groups of persons. Nursing staff on each of the six nursing units within orthopaedics and neurosciences was identified as a single group.

### Analysis at Service-Line Level

Statistical analysis was performed separately for the above queries with the assistance of the Director of the Statistical Consulting Center (SCC) and statistics students at Grand Valley State University. For all statistical analyses, a *p* value of 0.05 was used because of its wide acceptability in the scholarly community. Chi-square analysis and the Spearman correlation test was used to evaluate the relationships between variables at the service-line level. Spearman correlation, rather than Pearson correlation, is used when assumptions of the statistical test are not met and/or when the variables are ordinal in nature (Polit & Beck, 2012). The assumption of normal distribution was not met because of the small sample size (n=6) due to inability to obtain individual or raw data scores; therefore, Spearman correlation test was used.

The Chi-square test is used to determine if a statistically significant difference exists in frequencies of categorical variables or the dependence between two categorical variables. A variable that can be sorted by name or label into a limited number of categories is considered a categorical variable. Spearman correlation test assesses the relationship between two variables: overall nursing teamwork and personal job satisfaction, for example.

#### Overall teamwork and job satisfaction.

For the investigation of the relationship among overall nursing teamwork and personal job satisfaction each group was further divided into persons that scored high on the Gallup $Q^{12}$

measure of job satisfaction, and persons who did not score high on that instrument. This allocation led to job satisfaction as a categorical variable. For the purposes of the project, scoring high on the personal job satisfaction measure was identified as the individuals that selected "5" (extremely satisfied) on the *Q00. How satisfied are you with your organization as a place to work?* measure. This was selected based on the nature of Gallup polls reports and recommendation. The compilation of survey responses from patients is calculated using only "top box" scores, or those that select "5" (extremely satisfied) on the survey. Responses and sample size for each inpatient nursing units Gallup $Q^{12}$ survey results ranged from 28 participants to 61 participants, or from 62% participation to 84% participation.

**Overall teamwork and patient satisfaction.**

In the statistical analysis between the relationship among overall nursing teamwork and patient satisfaction, groups were divided into persons that selected "5" (very satisfied) in the "communication with nurses" composite within the HCAHPS survey, and all other persons. Again, this division led to the creation of patient satisfaction as a categorical variable. For analysis of HCAHPS, sample size ranged from 42 responses to 141 responses for each question within the three-question composite.

**Overall teamwork and patient falls.**

In the statistical analysis between the relationship among overall nursing teamwork and patient falls, groups were portioned: persons that had an unplanned descent to the floor during their hospital stay, and all other persons. The treatment of patient falls as a categorical variable, rather than a count allowed the assumptions of the Chi-square test with Spearman correlation to be performed. The sample sizes for inpatient falls ranged from 603 patient days to 1018 patient days.

Results reveal that a significant relationship exists between overall nursing teamwork within orthopaedics and neurosciences and patient fall rates ($p$=0.019) at the large Midwestern health care system. The correlation coefficient (-0.886) demonstrates that a negative relationship exists, or that as teamwork declines an increase in patient falls is noted. The relationship among these two variables is shown below in Figure 1.

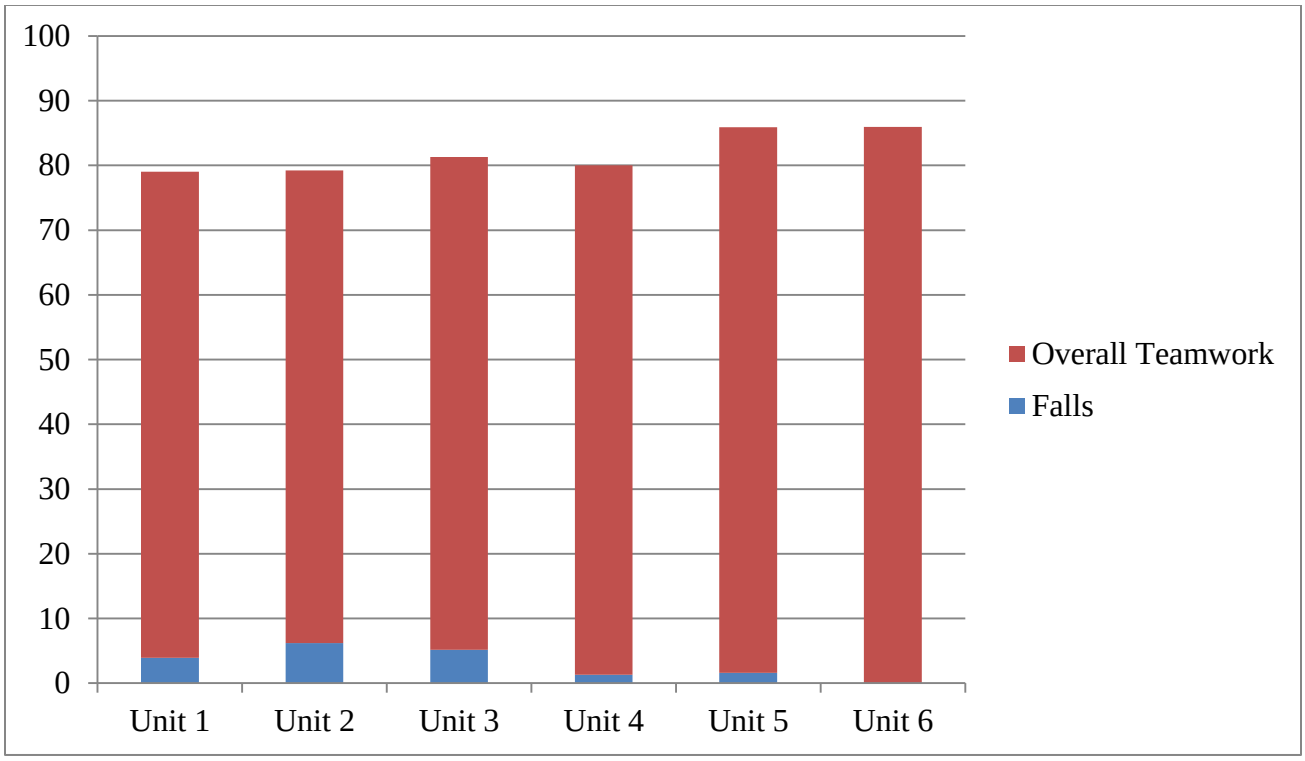


*Figure 1*. Overall Teamwork and Patient Falls

The relationship between overall teamwork and patient satisfaction or job satisfaction was not statistically significant ($p$=0.072 and $p$=0.397, respectively) at the service-line level of analysis. Although not statistically significant, the correlation coefficient for overall teamwork and patient satisfaction (0.771) and the correlation coefficient for overall teamwork and job satisfaction (0.429) demonstrate that a positive relationship exists between the variables. This suggests that as teamwork among nurses rises, patient satisfaction and nurses' job satisfaction

may also raise. Despite the moderate (0.429) and strong (0.771) correlations, the small sample size may be explanation for the non-significant findings ($p>0.05$).

Investigation of the relationship between each of the nursing teamwork subscales and job satisfaction, patient satisfaction, and fall rates was accomplished using Spearman correlation test. Figure 2 provides a diagram of the data used in the statistical analysis to determine the relationship among the subscales within the NTS and job satisfaction, patient satisfaction, and patient falls, where the horizontal (x) axis provides the unit (example: unit 1, unit 2, and so on) and the vertical (y) axis marks a percentage (job satisfaction or patient satisfaction) or raw number (falls). It is important to note that the percentage of individuals that were extremely satisfied did not exceed thirty-five percent.

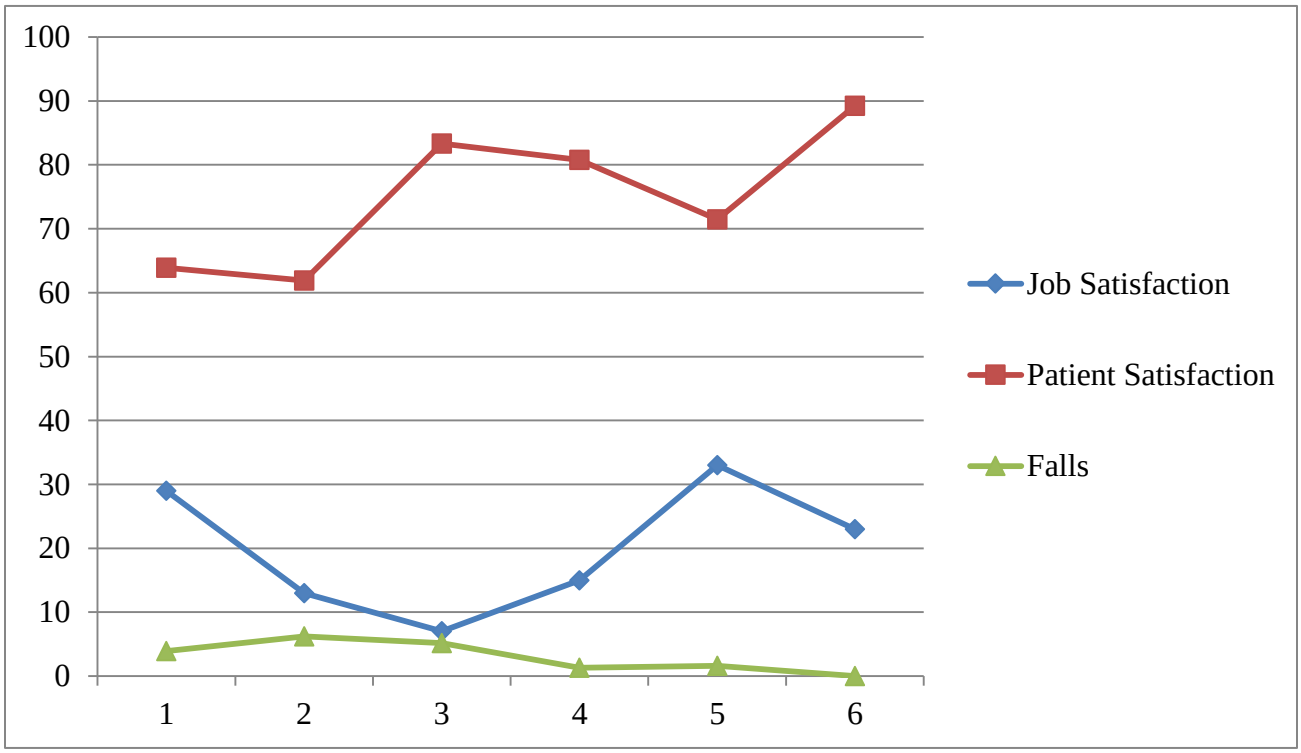


*Figure 2*. Unit Data

A summary table of the relationship among trust, backup, team orientation, shared mental models, team leadership and personal job satisfaction, patient satisfaction, and fall rates is

contained in Appendix F. Team orientation did not have a significant influence on the number of patient falls within orthopaedics and neurosciences; however, a significant relationship exists at the service line level between patient falls and four subscales: trust, backup, shared mental models, and team leadership ($p$=0.019; $p$=0.042; $p$=0.019; and $p$=0.005, respectively). Therefore, as team members monitor one another and assist one another with tasks or responsibilities, the potential exists that the number of patient falls will decline.

Of the four subscales that were found to have a significant impact on the number of patient falls, team leadership had the strongest relationship to patient falls. The negative correlation coefficient for team leadership and patient falls (-0.943) reveals that leaders within orthopaedics and neurosciences that adequately monitor and distribute the amount of work, and are willing to assist with workload may notice a decrease in the number of patient falls. None of the nursing teamwork subscales (trust, backup, team orientation, shared mental models, and team leadership) had a significant association with personal job satisfaction nor patient satisfaction at the service-line level of analysis.

**Analysis at Unit Level**

In addition to the statistical analysis at the service-line level, the doctoral student and statistical consultant opted to perform unit level analysis to aid in the provision of a dashboard of nursing teamwork for each unit within orthopaedics and neurosciences. To investigate that the correlation between overall nursing teamwork and personal job satisfaction or patient satisfaction or patient falls is the same on one inpatient nursing unit within orthopaedics and neurosciences as it is on another, a Chi-square test was performed with an odds ratio test.

As mentioned, the Chi-square test assesses the relationship between two categorical variables to determine if a significant difference between actual and expected data exists. The

odds ratio is utilized to determine if the odds of an outcome (example: satisfaction) are greater when compared to another outcome or variable.

**Overall teamwork and job satisfaction.**

For each unit within orthopaedics and neurosciences, the odds ratio was greater than 1 when investigating the relationship between job satisfaction and overall teamwork ($p<0.0001$). This suggests that a positive relationship exists, meaning that there is a positive association between job satisfaction and teamwork among nurses.

**Overall teamwork and patient satisfaction.**

In an examination of the relationship between patient satisfaction and overall teamwork for each unit within orthopaedics and neurosciences, one neuroscience unit was found to have a significant association between the two variables: patient satisfaction and teamwork ($p<0.05$).

**Overall teamwork and patient falls.**

Each of the units displayed a positive association between patient falls and overall teamwork when an odds ratio was performed. The odds ratio analysis allowed for comparison among patient falls relative to the comparison of teamwork and resulted in an odds ratio fewer than 1 on all units ($p<0.0001$). These results parallel the findings from the Chi-square test and Spearman correlation which determined that a negative or inverse relationship exists and as teamwork is heightened, the number of patient falls declines.

The relationship between each nursing teamwork subscale (trust, backup, team orientation, shared mental models, and team leadership) and personal job satisfaction, patient satisfaction, and fall rates were compared separately for six different groups of persons using the Chi-square test, presented as a cross tabulation. Statistical analysis reveals that there is a statistically significant positive association between job satisfaction and overall teamwork

($p<0.001$) and each of the five subscales within the NTS: trust, backup, team orientation, shared mental models, and team leadership ($p<0.001$) on each of the inpatient orthopaedic and neuroscience nursing units. This suggests that within nursing teams on each of the orthopaedic and neuroscience nursing units at a large Midwestern health care system, a higher level of nursing teamwork leads to greater job satisfaction.

The level of overall teamwork and levels of each subscale within the NTS (trust, backup, team orientation, shared mental models, and team leadership) were higher when patient falls were lower ($p<0.001$) on each inpatient nursing unit within orthopaedics and neurosciences at the large western Michigan health care system. Results suggest that patient falls are influenced by level of teamwork and teamwork behaviors (trust, backup, team orientation, shared mental models, and team leadership). This suggests that nursing teams that exhibit high levels of communication and feedback, willingness to assist each other, and awareness of roles and responsibilities may have fewer patient falls.

Within the six inpatient nursing units studied, three units displayed ineffective teamwork and were not meeting national benchmarks for personal job satisfaction among nursing staff, patient satisfaction, and fall rates. Additionally, results of statistical analyses for the three units suggest a statistically significant relationship between ineffective teamwork and patient outcomes. Ineffective teamwork was identified as having a lower level of overall teamwork than compared to the service-line average score for teamwork and having greater than 50% of teamwork subscales that are below the service-line average scores. Comprehensive inspection of results indicates that an intervention to enhance nursing teamwork is needed on three inpatient nursing units within orthopaedics and neurosciences.

**Thematic Analysis**

The doctoral student interviewed nursing staff within orthopaedics and neurosciences at the large, western Michigan health care system to discover current perceptions of nursing teamwork. The informal interviews were structured around five questions:

1. How would you describe the relationships among the nursing colleagues on your unit?
2. Tell me about your personal relationship with your co-workers.
3. What is your perception of the teamwork among your nursing colleagues?
4. In what ways do you wish teamwork was stronger on your unit?
5. In what ways could staff and patients benefit from enhanced teamwork?

Table 2 provides a summary of the number of individuals that were interviewed and is classified by role.

| Role | n |
|---|---|
| Registered Nurse | 23 |
| Nursing Technician | 11 |
| Unit Secretary | 8 |
| Nurse Educator | 0 |
| Clinical Nurse Specialist | 0 |
| Nurse Manager | 5 |

*Table 2*. Interview Sample

Critical examination of interview responses by thematic analysis was performed to identify patterns of meaning across the qualitative data. Theme development and revisions were shaped in a deductive way. Coding and theme development were directed by existing concepts from the Salas and colleagues (2005) Big Five in Teamwork model.

Nurses from six different nursing units within orthopaedics and neurosciences participated in informal interviews to describe their perceptions of nursing teamwork. The Big

Five in Teamwork model was applied to identify themes among informal interview responses. From the thematic analysis performed, five themes emerged: team orientation, team leadership, mutual performance monitoring, backup, and adaptability, which paralleled the Big Five in Teamwork model by Eduardo Salas and colleagues. Team orientation is defined as the cohesiveness among the team and the awareness of the team members as a team. The structure, support, and direction provided by a formal leader marks team leadership. Mutual performance monitoring is defined as the observation and awareness of team members while completing their own work while backup is the action of team members helping one another with tasks and responsibilities. Teams with high levels of adaptability are those that are able to adjust work as the environment changes.

Nursing staff readily commented on the leadership style of formal and informal leaders on the inpatient nursing unit. Team leadership weighed heavily on the decisions of staff to participate in unit committees or change projects. Staff provided examples of how charge nurses facilitated teamwork by appropriate distribution of work in assignment making or by providing assistance with tasks in a heavy assignment. Staff commented on the role that the charge nurses and unit secretaries play in welcoming staff that are "pulled" from other units—this was noted as a facilitator of teamwork and team leadership. The charge nurse was responsible for the creation of assignments, distribution of workload, and serving as an advocate for appropriate staffing levels in meetings.

Comments about teamwork and leadership style of the unit nurse manager and supervisor further highlighted role that formal leaders have in inspiring teamwork. Within orthopaedics and neurosciences, some nurses commented that the belief that all team members are responsible for the delivery of quality, efficient care was sparked by his or her nurse manager. The support of

each team member as an equal contributor to quality health care strongly suggests a manager with effective team leadership.

A large portion of staff struggled to communicate ways in which they exhibit mutual performance monitoring. However, some comments from team members on the orthopaedic trauma unit did engage in high levels of mutual performance monitoring. This was noted when a new trauma patient arrived on the nursing unit; several nurses and nursing technicians commented on how staff are aware of who is "up for the next admission" and readily come together to complete the admission tasks and care for the patient when they first arrive on the unit. A portion of this process was attributed to high levels of backup. Nursing staff on the orthopaedic trauma unit (unit 5) most clearly described mutual performance monitoring and backup behavior; other units did not describe these behaviors as readily.

Backup was most easily identified in a process deemed the "no pass zone". In interviews, an overwhelming amount of comments were made about the benefit of the "no pass zone"—a process where teammates respond to a call light when it is seen or heard in the hallway even if the patient is not in the staff members patient assignment. With implementation of the "no pass zone" staff members cannot walk past a call light in the hallway without responding to it. Helping one another with tasks during participation in the "no pass zone" was identified as the greatest facilitator of teamwork by nursing staff. Although unit secretaries are able to respond to call lights and notify the nurse or nursing technician of the patient need, there were few comments on the impact of other roles assisting with ones work. Limited remarks were made about nurses assisting with nursing technician or secretary work, or vice versa.

On one medical-surgical neuroscience unit (unit 1), seasoned staff members were quick to participate in backup behaviors to assist the newer, inefficient staff. One nurse mentioned that

turnover among nursing technicians aided in the enactment of backup behaviors because staff more readily assisted newer staff with the completion of tasks because they were slower because of being new to their role. Commenters mentioned that on some units within orthopaedics and neurosciences, seasoned staff form cliques, which results in those team members assisting friends before providing assistance to others.

Participation in activities outside of work led to the development of peer relationships. A high level of frustration and distress was seen in nurses that stated that they wanted to help teammates more often, but did not have time to because of a heavy or busy patient assignment. Nurses also commented that the charge nurse played a large role in the enactment of backup behaviors. The charge nurse assists with responsibilities like medication administration for nurses that may have a large or complex patient assignment.

Adaptability was easily observed on the orthopaedic and surgical unit (unit 6) during late mornings as surgical patients rushed in. Several patients arrived to the inpatient nursing unit from the post-anesthesia care unit within minutes of each other. Comments were made about the ability of the nurses and unit secretaries to quickly adjust to the increase in joint replacement (unit 5) patients during weekdays. Just as the team of nursing staff on the orthopaedic trauma unit exhibited high levels of mutual performance monitoring, they also displayed great adaptability. Nurses and nursing technicians easily adjusted their workflow to accommodate a new trauma patient.

In interviews it was noted that team members that work together regularly or share the same weekend rotation have a greater sense of belonging to a group, or team orientation. Registered nurses and nursing technicians easily identified themselves as a cohesive team on inpatient nursing units that pair nurses and technicians together in a patient assignment.

Individuals reported a desire to help those within their assigned team before assisting others because they are “in your team”.

A lack of team orientation was seen in nursing staff on opposite shifts. One nurse on the orthopaedic and medical surgical care unit ( unit 2) stated, “I feel like a lot of stuff gets left over…like, they [the evening or night shift staff] think, ‘we’ll leave it to the day team to take care’ because we see the physician”. The nurse went on to say that nurses on the orthopaedic and medical-surgical unit (unit 2) have attempted to increase team orientation between shifts by implementation of a staff satisfaction and engagement committee. Staff members that noted a high sense of team orientation and strong peer relationships identified that they were more willing to provide constructive feedback to a peer. Within orthopaedics and neurosciences, nursing staff on larger nursing units (greater than thirty-five beds, for example) struggled to identify oneself as part of the team and had a poorer sense of team orientation.

In comparing NTS results to interview responses, nurses on orthopaedic and neuroscience nursing units that exhibited effective teamwork displayed noteworthy behaviors: (a) appropriate delegation to the nursing technician or assistant (not under- or over-delegation), (b) willingness to provide feedback and work through conflict, and (c) belief that all team members are responsible for the delivery of quality, efficient care (not the responsibility of a single team member or role).

Teamwork problems became visible on inpatient orthopaedic and neuroscience nursing units and included: (a) lack of teamwork between shifts, (b) unavailability to help when needed, (c) social cliques or familiarity of team members, (d) larger nursing units with more team members and (e) high levels of turnover among nurses and nursing technicians.

Responses from staff during informal interviews indicate that formal and informal leaders on the inpatient nursing unit have a high degree of influence. This notion is supported by statistical analysis of NTS results. Researchers recognize that leadership within nursing is difficult and many formal leaders are not equipped to manage the challenges they face. Development of leadership skills through leader-specific orientation and training is recommended for charge nurses, supervisors, and nurse managers.

A recommended intervention to enhance leadership skills among formal and informal leaders is the intentional utilization of the crew resource management (CRM) techniques. CRM was developed in the discipline of aviation to enhance human-to-human interaction and improve safety (Salas & Frush, 2013). Research demonstrates that teamwork and efficiency were improved after a CRM intervention was implemented in a health care facility (West, et al., 2012).

The West and colleagues (2012) study provides a practical approach to improve nursing teamwork through a CRM intervention. CRM strategies are shown to improve communication, enhance clinical decision making, and inspire accountability and responsibility among team members. The study supports the use of classroom-style teaching of CRM techniques in addition to simulation. Teamwork behaviors and CRM strategies can be learned through education in the classroom, while simulation will allow nurses to practice conflict resolution, situational awareness, and clinical decision making in a simulated clinical setting. Researchers furthered the application of learnings through the inclusion and implementation of a clinical nurse-led project which encompasses CRM techniques. Nurses developed an innovative approach to allow for uninterrupted time for nursing technicians while completing essentials functions oftheir job (vital signs and point of care blood glucose sample). By the inclusion of protected time for nursing

technicians, communication between nurse and nursing technician was enhanced when an abnormal value was observed, and patient safety was upheld.

Study methods must be translated to meet the needs of the orthopaedic and neurosciences staff, which includes a need for improved team leadership, team orientation, and backup. The doctoral student believes that a partnership between nursing leadership and registered nurses, nursing technicians, and unit secretaries to create a CRM intervention that includes these components could result in improved levels of team leadership and teamwork, as supported in the study by West and colleagues (2012).

## Key Facilitators and Barriers

The greatest facilitator of the scholarly project was the increased interest in teamwork by leadership within the organization of interest. In contrast to other scholarly work on the phenomenon of teamwork, this scholarly project examined teamwork among nurses, nursing technicians, unit secretaries, nurse managers, clinical nurse specialists, and nurse educators. The assortment of roles included in the study facilitated a richer understanding of teamwork within the discipline of nursing. In addition, this scholarly project utilized robust measures of nursing teamwork, personal job satisfaction among staff members, and patient falls.

Inability to gather raw data results served as the largest barrier or limitation to the scholarly project; Having raw data would have allowed for an improved sample size at the individual unit level of analysis. Furthermore, the lack of a relationship between overall nursing teamwork and job satisfaction or overall nursing teamwork and patient satisfaction at the service-line level could be attributed to a small sample size, which is another limitation of this scholarly project.

## Stakeholder Support and Sustainability

The doctoral scholarly project was supported by nursing leadership within the large, Midwestern health care system because of its alignment with recent strategic and operational plans. The organization's operational plan includes approaches to improve the health of the communities they serve through 4 strategic enablers: (1) transform the model of care, (2) drive exceptional value, (3) grow with purpose, and (4) lead new health solutions.

The influence of nursing care on health care quality is well-documented (Griffiths et al., 2008; Thorp et al., 2012). Researchers found that high levels of nurse engagement and teamwork are correlated with a culture of patient safety and quality of care (Thorp et al., 2012). Leaders within the organization of interest supported the implementation of the teamwork project because of the documented relationship between nursing teamwork and quality outcomes, which then assists in achievement of the mission of the organization.

The presentation of teamwork dashboards and the evidence-based recommendation to key stakeholders and nursing leadership within the organization will assist in the sustainability of the project. The presentation included recommendation for continued implementation which include enactment of the evidence-based initiatives which includes CRM components to enhance nursing teamwork. Additionally, it will facilitate discussion on the topic of feasibility and effectiveness of implementation of the suggested evidence-based recommendation. The project will be sustained through the potential expansion to include analysis of teamwork on additional units, along with annual administration of the NTS as designed in the larger teamwork research initiative undertaken by the organization.

## Implications for Practice

Teamwork is associated with satisfaction among team members, level of patient satisfaction, as well as care quality and patient safety (Kalisch et al., 2007; Kalisch, Labelle et al., 2013; Kalisch, Lee, & Rochman, 2010; Kalisch, Weaver, & Salas, 2009; Xychris & Ream, 2007). The Centers for Medicare and Medicaid (CMS) services implemented a pay-for-performance system which provides financial penalty or reward based on patient experience and quality outcomes. In 2015, 1,375 organizations were penalized for not meeting their Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) and total performance goals (Stanowski, Simpson, & White., 2015).

Evidence suggests that one way to improve quality is to provide an evidence based intervention to improve teamwork (Barrett et al., 2001; Jain et al., 2006; Kalisch et al., 2015; Kalisch, Xie et al., 2013). Implementation of any type of teamwork intervention is complex and influences a variety of factors such as quality of care and patient experience and may require use of reliable and valid tools. The scholarly project assisted in understanding the impact of effective nursing teamwork using data from psychometrically sound measurement tools, which is critical to the further exploration of topic. Findings suggest that efforts to enhance teamwork and improve care quality in the acute care setting would have an impact on patient falls and staff satisfaction among nurses.

## Enactment of DNP Essentials

Successful completion of a doctoral education includes enactment of eight essential components, as required by the American Association of Colleges of Nursing (AACN) (AACN, 2006). The Essentials include: scientific underpinnings for practice, organizational and systems leadership for quality improvement and systems thinking, clinical scholarship and analytical methods for evidence-based practice, and information systems/technology. Patient care

technology for the improvement and transformation of health care as well as health care policy are also included as Essential components. These Essentials necessitate the evolution of a doctoral student and candidate to practice at the highest level of proficiency within the discipline of nursing and his or her specialty (for example, health systems leadership). The work in this scholarly project embodies the enactment and immersion of each of the Essentials. A summary of the enactment of doctoral-prepared nurse essentials is shown in Table 3.

| Enactment of DNP Essentials | |
|---|---|
| DNP Essential | Evidence of Enactment |
| **Scientific Underpinning** | Included science-based theories and concepts (example: conceptual framework) to best understand the phenomenon of interest and to guide project implementation |
| | Utilized the nursing process in the duration of the project |
| | Integrated nursing science with knowledge from ethics, psychosocial, and organizational sciences during the development of project methodology |
| **Organizational & Systems Leadership for Quality Improvement and Systems Thinking** | Conducted a thorough and robust organizational assessment to determine project feasibility given the current organizational, political, and economic perspectives |
| | Broadened the project scope to include six units within a service line, rather than an individual unit, to heighten the impact of the phenomenon |
| | Practiced advanced communication skills in the performance of informal interviews at the time of project implementation |
| | Understood the ethical risks and mitigated by full completion of IRB application and determination |

| DNP Essential | Evidence of Enactment |
|---|---|
| | Found that the outcomes of this quality improvement project indicate a need for the implementation of evidence-based interventions to enhance teamwork and reduce patient falls |
| | Tailored the project to the needs of the nurses and nursing leadership within the organization |
| | Developed an outline for the sustainment of project outcomes which may lead to increased effectiveness and patient safety |
| **Clinical Scholarship & Analytical Methods for Evidence-Based Practice** | Appraised literature in the completion of a thorough literature review on the phenomenon of nursing teamwork |
| | Evaluated outcomes of nursing practice on orthopaedic and neuroscience units within a Midwestern health care system |
| | Performed thematic analysis to identify and describe meaning among interview responses |
| | Performed statistical analysis of the impact of teamwork on patient outcomes and satisfaction among nursing staff |
| **Information Systems Technology Patient Care Technology for the Improvement and Transformation of Health Care** | Utilized information technology in the extraction and analysis of data |
| | Demonstrated use of statistics software to analyze the impact of teamwork on patient outcomes and satisfaction among nursing staff |
| | Secured written and electronic participant information or demographics and data |
| **Health Care Policy for Advocacy in Health Care** | Advocated for nurses in communication with legislators to create policies that support teamwork among health care workers |

| DNP Essential | Evidence of Enactment |
|---|---|
| **Interprofessional Collaboration for Improving Patient and Population Health Outcomes** | While this project is monodisciplinary, its outcomes and implications for practice may benefit an interprofessional team |
| **Clinical Prevention and Population Health for Improving the Nation's Health** | Results suggest that high levels of nursing teamwork have the potential to decrease or prevent patient falls. |
| **Advanced Nursing Practice** | Surveyed factors that impact current nursing practice and teamwork, including organizational, fiscal, cultural, and political issues |
| | Partnered with nursing leadership and staff to facilitate improved understanding of nursing teamwork and patient outcomes |
| | Delivered evidence-based recommendations for the enhancement of nursing teamwork and improvement of patient outcomes |

*Table 3*. Enactment of Essentials

## Plans for Dissemination of Outcomes

The robust dashboard of nursing teamwork will be presented to nursing leadership, which includes the Nursing Director of Orthopaedics and Neurosciences, along with nurse managers for each unit within the service-line. To aid in attendance of the presentation, it will occur at a regularly scheduled meeting for nursing leadership where each of the six nurse managers are expected to attend. Project outcomes were first shared with a key stakeholder and nurse leader within orthopaedics and neuroscience services at the large health care organization in the Midwest. Outcomes are to be disseminated at a leadership meeting for orthopaedic and neuroscience leaders in early January of 2017. Dissemination of outcomes will be presented to project committee members at a scholarly project defense. The project defense will occur in

early January of 2017. Project outcomes will be disseminated at a research conference at the large, Midwestern health care organization in the upcoming year. Plans for future dissemination of project outcomes include poster presentation and podium presentation at nursing conferences within the region.

## Conclusion

Literature supports the impact of nursing teamwork on staff performance measures and patient outcomes in the acute care setting. This scholarly project examined the relationship between nursing teamwork and personal job satisfaction among nurses, patient satisfaction, and patient falls on orthopaedic and neuroscience units at a large Midwestern health care system. Nursing teamwork was found to significantly impact patient fall rates ($p<0.05$) at the service line and unit level of analysis. A statistically significant relationship among teamwork and staff satisfaction or patient satisfaction was not observed. Results from statistical and thematic analyses indicate that a need for evidence-based interventions to enhance teamwork exists. Prevention of patient falls through improved nursing teamwork has potential to improve health care delivery and costs.

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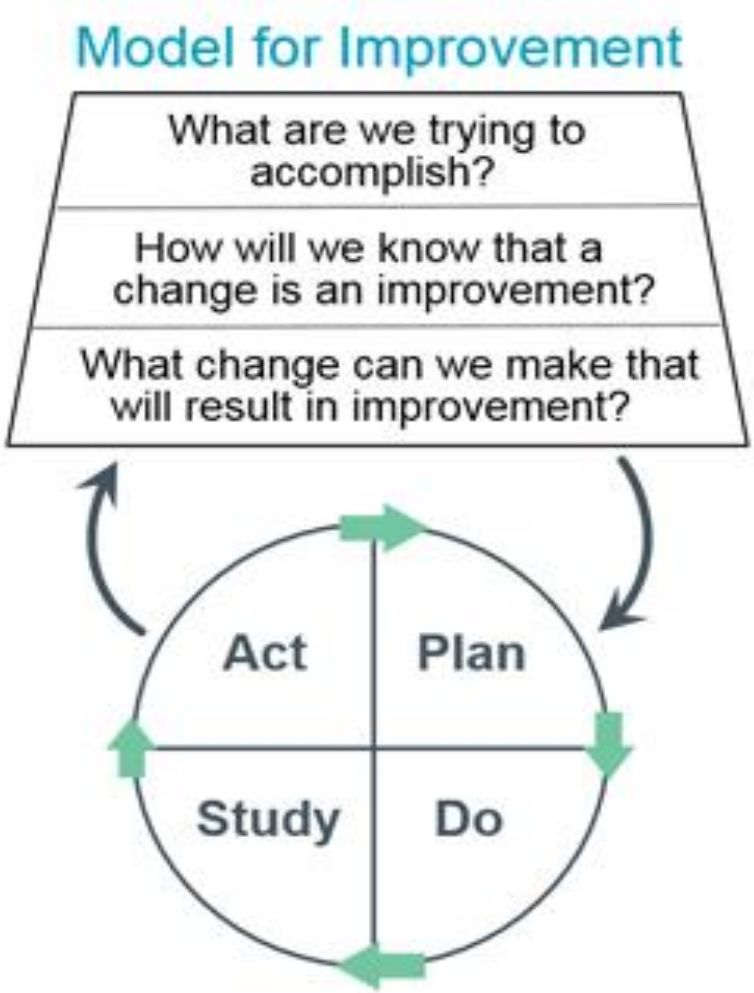
Appendix A

IHI Plan, Do, Study, Act Model




Used with permission from Institute for Healthcare Improvement (n.d.). *Six quality improvement questions for an IHI improvement advisor*. Retrieved from http://www.ihi.org/resources/Pages/ImprovementStories/QandAonQISixQuestionsForIHIImprovementAdvisor.aspx

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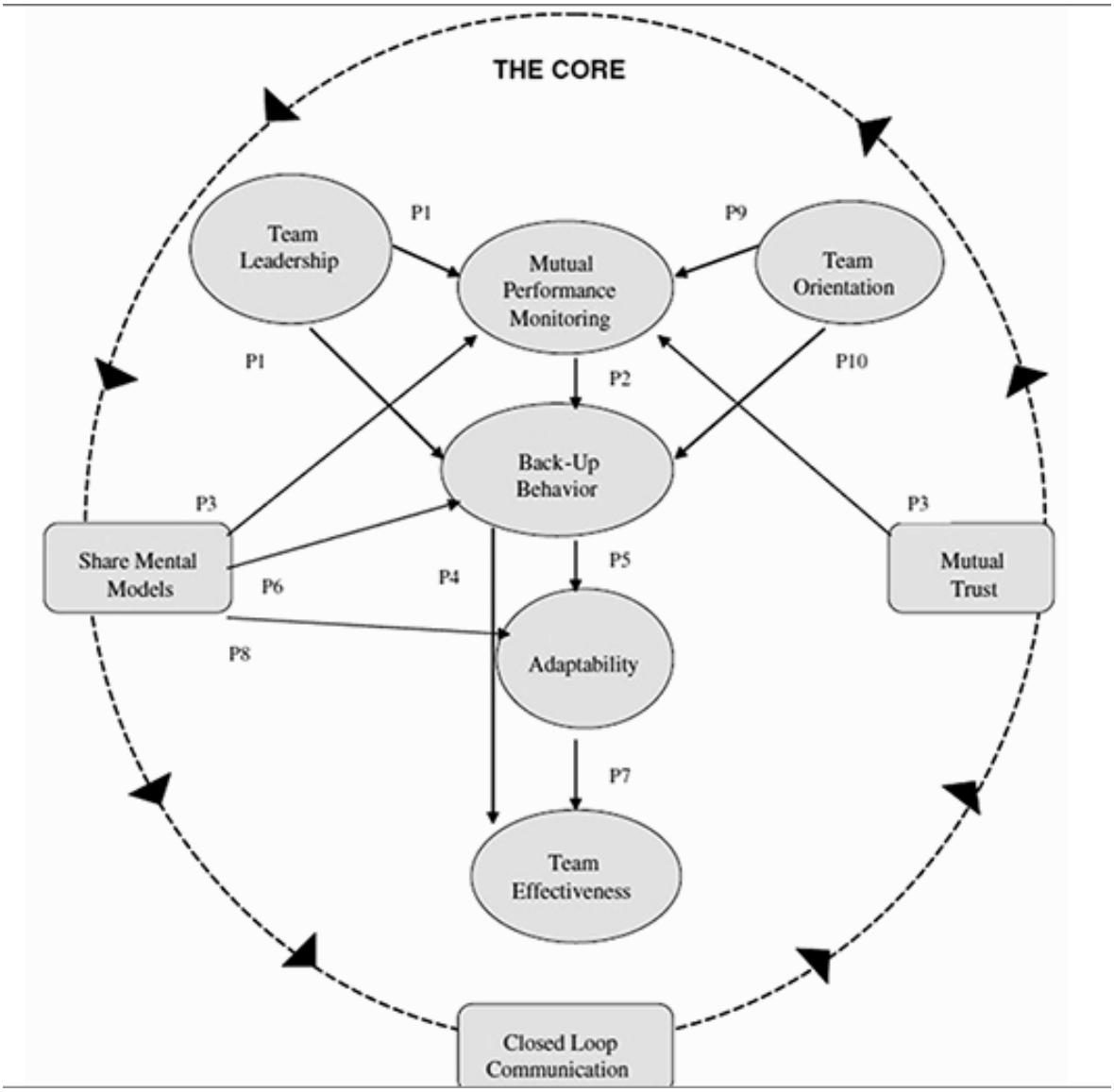
Appendix B

The Big Five in Teamwork Model




Adapted with permission from Salas, E., Sims, D.E., & Burke, C.S. (2005). Is there a "big five" in teamwork? *Small Group Research, 36*(5), 555-559.

# Appendix C

## IRB Determination Letter

DATE: November 21, 2016
TO: Jenna Stoll, BSN
FROM: Grand Valley State University Human Research Review Committee
STUDY TITLE: [974218-1] Nursing Teamwork: An Element of Excellence
REFERENCE #:
SUBMISSION TYPE: New Project
ACTION: NOT RESEARCH
EFFECTIVE DATE: November 21, 2016
REVIEW TYPE: Administrative Review

Thank you for your submission of materials for your planned research study. It has been determined that this project:

*Does not* meet the definition of covered human subjects research* according to current federal regulations. The project, therefore, *does not* require further review and approval by the HRRC.

Related problem or event resulting in a fatality or hospitalization requires immediate notification to the Human Research Review Committee Chair, Dr. Steve Glass, (616)331-8563 **AND** Human Research Protections Administrator, Dr. Jeffrey Potteiger, Office of Graduate Studies (616)331-7207. See *HRRC policy 1020, Unanticipated problems and adverse events.*

Exempt research studies are eligible for audits.

If you have any questions, please contact the Office of Research Compliance and Integrity at (616) 331-3197 or rci@gvsu.edu. The office observes all university holidays, and does not process applications during exam week or between academic terms. Please include your study title and reference number in all correspondence with our office.

*Research is a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge (45 CFR 46.102 (d)).

*Human subject* means a living individual about whom an investigator (whether professional or student) conducting research obtains: data through intervention or interaction with the individual, or identifiable private information (45 CFR 46.102 (f)).

Scholarly activities that are not covered under the Code of Federal Regulations should not be described or referred to as *research* in materials to participants, sponsors or in dissemination of findings.

Appendix D

## CONSENT FORM FOR NURSING TEAMWORK: ANECDOTAL REPORT

### INTRODUCTION

The purposes of this form are to provide you (as a prospective participant) information that may affect your decision as to whether or not to participate in this inquiry of nursing teamwork and to record the consent of those who agree to be involved. Jenna Stoll, BSN, RN, ONC and Doctor of Nursing Practice (DNP) Health Systems Leadership student at Grand Valley State University has invited your participation in an inquiry entitled Nursing Teamwork: Anecdotal Reports.

### PURPOSE

The purpose of the inquiry is to examine the level of nursing teamwork and perceptions of teamwork among the nursing workforce in orthopaedics and neurosciences. For the purposes of this inquiry, nursing workforce is defined as registered nurses, nursing technicians, unit secretaries, nurse managers, clinical nurse specialists, and nurse educators.

### DESCRIPTION

You are being asked to participate because you are a part of the nursing workforce in orthopaedics and neurosciences. If you say yes, then your participation will last for the length of time it takes you to complete the disclosure of your perceptions of nursing teamwork. Estimated time to complete the anecdotal report is 5-10 minutes. By consenting, you are permitting the investigators to record and analyze your response. No personal identifiers will be secured to your response. For your protection, results will only be analyzed or presented at the aggregate unit level. Your participation is greatly appreciated by the doctoral student and the health care organization.

### CONFIDENTIALITY

All information obtained in this inquiry is strictly confidential. The results of this inquiry may be used in reports, presentations, and publications, but the interviewer will not identify you. In order to maintain confidentiality of your records, Jenna Stoll, will maintain your privacy and confidentiality by using a code that does not identify you as a participant, but rather, describes the unit, shift, and role of the participant. This will be used to analyze the data at the aggregate unit level. Only the doctoral student will have access to the data, which will be kept in a password protected electronic device. All data obtain from this study will be kept for one (1) year after completion of the study and then destroyed.

### WITHDRAWAL PRIVILEGE

Participation in this inquiry is voluntary. Participation in this inquiry will not affect your employment status. You may withdraw from the inquiry at any time. Sharing your anecdotal response of nursing teamwork implies consent to participate.

Participant Full Name _____

Participant Signature _____ Date_____

Appendix E

Data for Evaluation

| Unit | OT | Trust | Backup | TeamO | SMM | Tlead | JS | PS | Fall Rate |
|---|---|---|---|---|---|---|---|---|---|
| **1*** | 75.1 | 74.06 | 72.62 | 67.2 | 82.74 | 78.87 | 29% | 63.89% | 3.93 (4/1018) |
| **2*** | 73.02 | 69.94 | 70.68 | 68.75 | 79.14 | 76.56 | 13% | 61.38% | 6.22 (6/965) |
| 5 | 78.75 | 76.48 | 75.82 | 76.03 | 84.86 | 80.57 | 15% | 80.77% | 1.29 (1/778) |
| 4 | 84.29 | 81.68 | 81.85 | 84.95 | 88.71 | 84.27 | 33% | 71.43% | 1.62 (1/616) |
| 6 | 85.95 | 89.42 | 81.17 | 83.85 | 90.61 | 84.72 | 23% | 89.25% | 0 (0/603) |
| **3*** | 76.14 | 74.07 | 71.6 | 72.22 | 84.79 | 78.81 | 7% | 83.33% | 5.15 (3/583) |

| Key |
|---|
| OT=Overall Teamwork |
| TeamO=Team Orientation |
| SMM=Shared Mental Models |
| Tlead=Team Leadership |
| JS=Job Satisfaction |
| PS=Patient Satisfaction |
| Above Service Line Average |
| Below Service Line Average |
| **Bold*** =Need an intervention to enhance teamwork |

Appendix F

Service Line Level of Analysis: Outcomes

| variables | p value ($\alpha = p<0.05$) | correlation coefficient |
|---|---|---|
| OT & JS | 0.397 | 0.429 |
| OT & PS | 0.072 | 0.771 |
| OT & Falls | 0.019 | -0.886 |
| Trust & JS | 0.397 | 0.429 |
| Trust & PS | 0.072 | 0.771 |
| Trust & Falls | 0.019 | -0.886 |
| Backup & JS | 0.072 | 0.771 |
| Backup & PS | 0.397 | 0.429 |
| Backup & Falls | 0.042 | -0.829 |
| TeamO & JS | 0.468 | 0.371 |
| TeamO & PS | 0.266 | 0.543 |
| TeamO & Falls | 0.156 | -0.657 |
| SMM & JS | 0.397 | 0.429 |
| SMM & PS | 0.072 | 0.771 |
| SMM & Falls | 0.019 | -0.886 |
| Tlead &JS | 0.156 | 0.657 |
| Tlead & PS | 0.208 | 0.6 |
| Tlead & Falls | 0.005 | -0.943 |

| Key |
|---|
| OT=Overall Teamwork |
| TeamO=Team Orientation |
| SMM=Shared Mental Models |
| Tlead=Team Leadership |
| JS=Job Satisfaction |
| PS=Patient Satisfaction |
| Statistically significant ($p<0.05$) |