Investigating Organizational Supports and Outcomes of Interprofessional Team Training Initiatives in a Medical Teaching Hospital

By

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First and foremost, I give honor and praise to my Heavenly Father. ‘Trust in the Lord with all your heart, and lean not on your own understanding; in all your ways acknowledge Him, And He shall direct your paths” Proverbs 3:5-6.

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Lastly, I warmly thank the participating health professionals for their willingness to engage in this project and their commitment to patient-centered, collaborative care.
DEDICATION

This dissertation is lovingly dedicated to my parents, Occie and Barbara Vause, for their unwavering support, love and belief in me throughout my life. Their encouragement and fascination with all my life goals keeps me striving to do my best.

This work is also dedicated to my brother, Steven Vause, and sister, Susan Vause. Thanks you for tolerating my rollercoaster lifestyle over the years and keeping me grounded just the same.

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ABSTRACT

Investigating Organizational Supports and Outcomes of Interprofessional Team Training Initiatives in a Medical Teaching Hospital

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Healthcare systems are challenged to provide safe, effective, patient-centered care in an ever-changing environment. Studies show that lack of teamwork, communication, and collaboration may contribute to adverse patient and health outcomes (Manojlovich, 2009; Weaver et al., 2014, Jones, Skinner, High, & Reiter-Palmon, 2013). Consequently, more healthcare systems are launching team-training programs in efforts to improve clinical outcomes. Despite team-training efforts, adoption of interprofessional teamwork in practice is slow to transpire. Team training alone is not sufficient to facilitate and sustain teamwork behavior in day-to-day practice. The purpose of this correlational study was to investigate the relationship between key organizational supports (e.g., team climate, team-training, formalization tools) with team-functioning and patient outcomes in an urban medical teaching hospital. Few empirical studies have provided insight into the relationship between these variables. Many studies overlook the organizational context and its effect on team functioning. In this study, researchers used the short-version Team Climate Inventory (TCI-14)
and the Brief TeamSTEPPS® Teamwork Perception Questionnaire (Brief T-TPQ) to survey 88 (73.3%) interprofessional health providers on six hospital work units. Retrospective patient-reported data (n=957) were analyzed to examine association between patient satisfaction and interprofessional teamwork. Results found a strong association between team climate and team-functioning on the six hospital work units; a small to moderate relationship between team-training intervention and interprofessional teamwork; no relationship between number of communication tools used on hospital units and team function; and no significant correlation between patient satisfaction and health provider’s perception of teamwork. However, from the patient’s experience, results showed a significant and strong interaction between interprofessional team functioning and patient’s satisfaction. This research adds to the body of knowledge supporting the relevance and implementation of interprofessional teamwork in healthcare environments in efforts to improve quality of care and patient satisfaction. Study outcomes highlight two important considerations: 1) the need for organizational supports to enhance and sustain interprofessional teamwork; and 2) the importance of recognizing the relationship between team functioning and the patient’s experience as reflected in the patient satisfaction survey.
Chapter 1: Introduction and Background

Context and Background of the Problem

Healthcare systems are growing increasingly more complex and multidimensional. There is an immediate need to address efficiency and ensure positive patient outcomes. Health providers are beginning to recognize that no single profession has the means to address today’s complex patient issues exclusively (Brownie, Thomas, McAllister, & Groves, 2014). There is a developing consensus among health providers, policymakers, health organizations, and consumers that interprofessional (interdisciplinary) team approaches promote effective collaboration and patient-centered care in healthcare settings. A small but growing body of literature suggests that interprofessional teamwork, in addition to organizational supports, have a changing effect on patient outcomes. Notwithstanding, evaluating the effects of interprofessional teamwork on patient outcomes is a challenging and complicated endeavor. This is partially due to the intricacy of human relationships and organizational processes which influence team effectiveness in the workplace.

Even in the absence of robust evidence supporting team outcomes, this promising approach to care is gaining momentum nationally and globally. The Institute of Medicine’s (IOM) health professions education summit in 2003 recommended that “all health professionals be educated to deliver patient-centered care as members of an interdisciplinary team, emphasizing evidence-based practice, quality improvement approaches and informatics” (IOM, 2003). One of the five core competencies mentioned in the IOM’s 2003 report includes,
work in interdisciplinary (interprofessional) teams – cooperate, collaborate, communicate, and integrate care in teams to ensure that care is continuous and reliable” (IOM, 2001, 2003). Internationally, the World Health Organization (WHO) has been eager to advance the interprofessional training and practice agenda. The belief is that well-trained interprofessional teams can make substantial improvements in quality of care.

In the seminal report, *To Err is Human: Building a Safer Health System*, the IOM recommended initiating interprofessional team training programs as a method for reducing harm due to medical errors (IOM, 2000). In 2013, team-training was recognized as a primary approach to ensure patient safety in acute care hospitals (Shekelle, Pronovost, & Wachner, 2013). In efforts to address the knowledge, skills and attitude necessary for change in practice, a growing number of health institutions are currently implementing team-training programs. Team training is defined as an instructional strategy which provides team members with the opportunity to practice skills related to teamwork competencies and receive feedback in the context of a learning environment (Weaver, Dy, & Rosen, 2014). Team training content and methods are not always the same. Training is typically task-oriented and can include didactic teaching, simulation-based, and/or case-based activities. Team training is considered a systematic process aimed to ameliorate communication and collaboration of interprofessional teams. Training programs are typically created such that teamwork competencies can be generalized by the learner across different team settings (Weaver et al., 2014).
Effective team training initiatives require more than educational workshops to promote transfer of skill and sustain team processes in the workplace. Little is known about the key factors which have influence on team training outcomes. Limited evidence suggests team training programs coupled with organizational supports such as a positive work climate can promote and sustain high functioning teams (Baker, 2006; Jones, Skinner, High, & Reiter-Palmon, 2013; Salus, 2009). This study advances the understanding of the key organizational determinants associated with effective implementation and sustainment of interprofessional teamwork in care environments.

**Definitions and terms.**

**Teams.**

Teams are defined as “Two or more people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable” (Katzenbach, 1993). In healthcare, team members have specific roles and functions and must interact dynamically, respectfully, and interdependently towards a shared mission (E Salas, Dickinson, Converse, & Tannenbaum, 1992). Team members adjust to changing situational events in order to successfully meet team goals.

**Interprofessional teamwork.**

Interprofessional teamwork is a complex dynamic relationship between different professionals from different backgrounds, who share a team identity and work closely together in efforts to provide the highest quality of patient-centered care (Reeves, 2010). Teamwork reflects the behaviors of teams: the level of cooperation, coordination and collaboration required to deliver coordinated,
patient-centered care. However, functioning as a cohesive team is not necessarily an intuitive process. Deliberately working together with a common goal does not automatically unfold in healthcare environments. In fact, the healthcare educational system structures professional training in silos with minimal opportunity to interact, collaborate and explore each other’s role during the pre-licensure training process. Many health professional cultures continue to foster separateness and autonomy. Uniprofessional cultures can actually be a barrier to collaborative teamwork as each discipline is socialized to become territorial with their domain of practice.

### Interprofessional competencies.

Interprofessional competencies in health care are the knowledge, skills and attitudes needed to promote teamwork across the professions and with patient/family members. In 2011, the Interprofessional Education Collaborative (IPEC) Network established four core interprofessional practice competency domains (teamwork concepts): 1) values/ethics for interprofessional practice; 2) roles/responsibilities; 3) interprofessional communication; and 4) teams and teamwork (Panel, 2011). A list of measurable competency objectives is provided for each domain.

The **values/ethics for interprofessional practice** competency domain refers to the practitioner’s moral obligation to work with others to improve patient care. The practitioner exhibits respect for the unique cultures, values, and expertise of team members. The practitioner is committed to act with honesty and integrity with the interprofessional team, including patient and families. The **roles/responsibilities** competency domain refers to the shared acknowledgement
of the team member's role and expertise. It also includes recognizing one's own limitations in knowledge and skills; engaging team members as appropriate. The third core competency domain of *interprofessional communication* consists of the ability to give timely constructive feedback to colleagues, clients and their family in a respectful manner.

The final competency domain, and most pertinent to this study, is *teams and teamwork*. Through interprofessional teamwork, practitioners deliver patient-centered care efficiently and effectively. Teamwork takes into account interdependence, a shared team identity, shared responsibility, integration, and an overall strong sense of membership within the team culture (Reeves, 2010). High functioning teams require more than the individual skill sets of its members. Interprofessional teamwork relies on the team members’ capability to transfer these competencies in context. In addition, it is hypothesized that factors such as team climate and other organizational dimensions must be in place in order to successfully support this transition.

**Statement of the Problem**

Interprofessional teamwork is a model of practice that has potential to promote patient-centered, integrated care yielding positive patient outcomes in today’s healthcare environments. Despite growing evidence of the benefits of interprofessional teamwork, collaborative efforts are slow to transpire in health care environments. Weight should be placed on exploring the relationship between the organizational climate (i.e., health care providers’ perception of policies, procedures, programs, and reward systems) and the enactment and effectiveness of sustained interprofessional teamwork. Studies have shown that
interprofessional teams often fail because of insufficient expertise in the management of team processes (Weaver et al., 2014).

Organizational supports (e.g. leadership, formalization tools, information exchange, team training) in conjunction with a strong work climate may play a critical role in promoting and sustaining team performance. Team-training interventions have become a well-established educational method with goals to increase interprofessional collaboration, improve patient safety and enhance patient outcomes. For example, the Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) system is an evidence-based program specifically designed to address four core areas of competency: team leadership, situation monitoring, mutual support and communication.

Studies have shown positive outcomes from TeamSTEPPS® intervention immediately post implementation and at six and twelve months post implementation. However, in one study researchers recognized that once the training was over, the total effect did not last (Jones et al., 2013). Other organizational supports must be identified and engaged within a work climate to ensure long-lasting effects of team-training programs once implementation is completed. New research will inform organizations on the strategies that are needed to facilitate teamwork and sustain team outcomes in the workplace.

**Research Aims, Questions and Hypotheses**

The research aim is to understand the relationship between organizational supports (e.g., team climate, interprofessional training, and communication strategies), team function, and patient outcomes. Additionally, the research explores the effect of work climate between high and low functioning teams. This
study adds to the body of knowledge supporting the implementation and sustainability of interprofessional teamwork and recognizes the influence of key organizational factors needed to potentially transform work culture.

It is hypothesized that organizational supports such as formalization tools, team training opportunities and a strong team climate, will be positively associated with team functioning, and patient satisfaction outcomes in a medical academic hospital. The study sample is carefully selected hospital units within an urban teaching hospital. A hospital unit is considered an area in the hospital organization which provides specialized patient care.

**Research hypotheses and rationale.**

Recent scientific evidence indicates team-training interventions alone will not sustain effective team functioning and improve patient outcomes (E. Salas et al., 2008; Weaver et al., 2014). Team-training works, but organizational support influences adoption. To ensure a sustained change in the worksite, organizations must provide supportive context for effective teamwork (Salas & Rosen, 2013). Jones, et al. (2013) found that the effects of team training actually decreased when organizational support (e.g. formalization tools, leaders reinforcing the value of teamwork) was not implemented.

Attention must also focus on the team climate. In order for team performance to flourish, organizations must embed teamwork concepts in policies and practices, thus shaping the work culture. It is proposed that organizational supports bundled with team training initiatives are positively associated with team functioning and patient care outcomes. Due to the paucity of studies validating this position, further research is warranted. This research
project focuses on the following two hypotheses. The first hypothesis is separated into three sub-hypotheses. Each sub-hypothesis addresses a different aspect of organizational support.

**Hypothesis 1**: As organizational support for interprofessional healthcare team functioning (interprofessional teamwork) in a hospital unit increases, interprofessional teamwork in that hospital unit improves.

**Hypothesis 1a**: As hospital unit team climate improves, interprofessional teamwork in that hospital unit improves.

**Null Hypothesis 1a**: There is no relationship between hospital unit team climate and interprofessional teamwork in that hospital unit.

**Hypothesis 1b**: As team training exposure in a hospital unit increases, interprofessional teamwork in that hospital unit improves.

**Null Hypothesis 1b**: There is no relationship between team training exposure in a hospital unit and interprofessional teamwork in that hospital unit.

**Hypothesis 1c**: As the use of communication strategies on the hospital unit increases, interprofessional teamwork in that hospital unit improves.

**Null Hypothesis 1c**: There is no relationship between using communication strategies in a hospital unit and interprofessional teamwork in that hospital unit.

**Hypothesis 2**: As interprofessional healthcare team functioning (interprofessional teamwork) in a hospital unit improves, patient satisfaction with that hospital unit improves.
Null Hypothesis 2: There is no relationship between interprofessional healthcare team functioning (interprofessional teamwork) and patient satisfaction with that hospital unit.

Key stakeholders agree that the priority is to measure the impact of interprofessional education (IPE) and team performance on patient outcomes. Patient satisfaction continues to be an important outcome indicator. It directly measures the first dimension of the Institute of Healthcare Improvement’s ‘Triple Aim’ goal: Improving the patient experience of care (Brandt, 2014).

Significance/Need for Study

There are three outcomes that underline the need for this study. There is a need to: 1) advance knowledge about team process; 2) advance knowledge about team effect; and 3) advance knowledge about key organizational factors supporting team function. First, this study is needed to systematically look at the complex, dynamic process of implementing and sustaining teamwork behaviors by identifying those team characteristics and organizational determinants that are associated with team functioning and patient outcomes in a medical teaching hospital. As growing evidence reveals interprofessional teamwork improves quality of care and safety, more healthcare systems are instituting team-training programs. However, Salas’ et al (2008) meta-analysis found that team-training accounted for less than 20% of the variance in team performance. Albeit well-established evidence-based team training programs, it is important to determine the other organizational variables which influence high functioning teams post-training. Understanding what transpires after team-training exposure is essential to ensuring behavioral and cultural change. This study underscores those
factors that may help sustain and routinize team performance in various work units in a medical teaching hospital.

A recent scoping review of interprofessional collaborative practice and education found that despite four decades of research, investigators have yet to determine the association between interprofessional teamwork and improved population health, quality of care and/or reduced healthcare costs (Brandt, 2014). In fact, there are a few studies that indicate a negative or no relationship between interprofessional teamwork and positive clinical outcomes (Bosch, 2008; Higginson, 2003; Manojlovich, 2009). The evidence suggests that healthcare cultures can be either contributory or detrimental to team outcomes. This lack of congruity within the literature implies the relationship between organizational factors, interprofessional teamwork and its effectiveness is not well established and further study is warranted.

This project examines the relationship between interprofessional teamwork, organizational supports (e.g. team-training, team climate, communication strategies) and patient outcomes (See Appendix A). Findings from this study have applicability to guide medical teaching hospitals and future team-training curriculums by identifying the essential supports needed to promote and sustain interprofessional team behavior, improve patient outcomes, quality of life, and the potential reduction of healthcare costs.
Chapter 2: Review of the Literature

Introduction

This review appraises the available evidence relevant to this dissertation. The literature was searched to identify work related to: 1) analytical frameworks for understanding interprofessional teamwork and team climate; 2) organizational determinants of teamwork; 3) the role of organizational context (team climate); and 4) the impact of interprofessional training on team functioning and patient outcomes.

Sources, Search Strategies, and Selection Criteria

A Search for evidence on organizational supports as it relates to interprofessional teamwork was conducted using Ovid MEDLINE (OVID’s Advanced Search option was consistently used). The following databases were used: Cochrane Database of Systematic Reviews, Cochrane Register of Controlled Trials, Database of Abstract of Reviews of Effects, CINAHL (Cumulative Index to Nursing and Allied Health Literature), Sociological Abstracts, PsychINFO, and Medline for the period 2004 to present. This time period was chosen because there has been a heightened interest and growing recognition on the way in which organizational factors influence team performance over the past ten years. Thus, recent studies conducted over the past decade became the primary target for this review.

There are a number of terms used to describe teamwork among health professionals. Keywords and medical subject headings used to search the database included interprofessional, interprofessional team, interdisciplinary, collaboration, team climate, team effectiveness, team functioning, patient
outcomes, determinants and factors. Boolean operators (OR, AND) were used as appropriate. In addition, relevant journals were manually searched using an ancestry approach (snowballing); a process that involves reviewing the reference lists of articles already obtained.

A practical and methodological screening criterion was applied to empirical articles that examined data on determinants of interprofessional teamwork. The studies in this review were carefully selected and critically appraised using methodology checklists from Scottish Intercollegiate Guidelines Network (2012) and a comprehensive critical appraisal tool for qualitative studies (Cote, 2005). The articles were manually screened for congruity and overall value based on inclusion and exclusion criteria. Inclusion criteria consisted of four components: 1) the study presented a structured interprofessional team-based intervention or interprofessional exchange among two or more health professionals; 2) the study specifically uncovered/observed/colllected data on determinants of interprofessional teamwork and/or the effects of team functioning on patient outcomes in various healthcare settings; 3) the study design used an individual randomized control trial (RCT), quasi-experimental trial, cross-sectional survey study, or qualitative study (phenomenology, grounded theory, ethnographic observation); and 4) the study was a peer-reviewed primary study published in English after 2004.

Retrospective studies, single case studies and expert-opinion papers were excluded from the review. If the article was outside of the scope of interprofessional teamwork or there were less than two different health
professionals involved, the article was excluded. Due to the limited number of RCT and nonequivalent control group design studies, quasi-experimental, cross-sectional surveys, and qualitative studies were acceptable in order to widen the methodological and outcome focus and acquire new knowledge and understanding of the determinants of teamwork. Additional independent searches were conducted to include the impact of interprofessional training on team functioning utilizing the same search strategies. Terms used included interprofessional education, team training, team functioning, team performance, interprofessional training, teamwork, and TeamSTEPPS® mapped to its MESH terms including subheadings. Boolean operators (OR, AND) were used as appropriate.

**Review of the Literature**

*Analytical framework.*

There are a number of frameworks in the literature which conceptualize interprofessional teamwork and collaboration in health care. Examples include, but are not limited to: Analytical Framework of Interdisciplinary Collaboration (Sicotte, D’Amour, & Moreault, 2002); A Model for Interdisciplinary Collaboration (Bronstein, 2003); Input, Process, and Output Model of Team Effectiveness (West, Borrill, & Unworthy, 1998); Five-Stage Model of Collaboration (Gitlin, 1994); Structuration Model of Collaboration (D’Amour, Goulet, Labadie, Martin-Rodriguez, & Pineault, 2008) and The Four-factor Theory of Innovation (West, 1990). The latter two are used to guide this dissertation research. These are two well-formulated, tested, multidimensional frameworks which recognize the
complexities of teamwork and highlight the influence of organizational factors including work climate.

**Structuration model of collaboration.**

The Structuration Model of Collaboration (D’Amour, Goulet, Labadie, Martin-Rodriguez, & Pineault, 2008; D’Amour, Goulet, Pineault, Labadie, 2004) is a comprehensive model that considers both the interactional and organizational factors which exist in healthcare organizations. Leaders in the field of organizational theory have advocated for new models of explaining the multidimensional nature of interdisciplinary/interprofessional teamwork (Ilgen, 2005). The Structuration Model of Collaboration helps to recognize the complexity of human relationships and organizational processes which influence team performance. Examining interactions is the key to understanding multifaceted team behaviors between health professionals.

In its original form, this model draws from the input-process-output model (S. Cohen, & Bailey, D., 1997). The *inputs* are related to the structural characteristics and organizational characteristics; the *processes* include shared goals/vision, internalization/sense of belonging; formalization (tools, information exchange); and governance (leadership, centrality, support for innovation, and connectivity). The *outputs* are identified as quality of patient care/patient outcomes, improved interdisciplinary teamwork, and professional satisfaction (Sicotte et al., 2002).

This model is also based on the concept of “collective action” in organizational sociology (D D’Amour, Goulet, Labadie, Martin-Rodriguez, & Pineault, 2008). Originally used in analyzing political and social processes, the
concept of collective action is “a product of the actions and behaviors of various partners” (D’Amour, Goulet, Labadie, et al, 2008, p. 2). Collaboration is the focal point of collective action, resulting in effective patient-centered care. The Structuration Model of Collaboration proposes that collective action (i.e., teamwork) can be examined by highlighting four dimensions (determinants): 1) governance, 2) shared goals and vision, 3) formalization, and 4) internalization. Table 1 depicts these four dimensions (determinants) of the model. Two of the dimensions focus on interactional behaviors between individuals and two involve organizational determinants. The four dimensions are interrelated and affect each other.

<table>
<thead>
<tr>
<th>Organizational Dimensions</th>
<th>Interactional Dimensions</th>
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<td>Governance</td>
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<td>Leadership</td>
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<td>Support for innovation</td>
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<td>Connectivity</td>
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<td>Formalization</td>
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<td>Formalization tools</td>
<td>Mutual acquaintanceship</td>
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<td>Information exchange</td>
<td>Trust</td>
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<td></td>
<td>Sense of belonging</td>
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*Note: Adapted from D’Amour et al, BMC Health Services Research 2008, 8:188. Doi:10.1371/journal.pone.0050022.t001*

The Structuration Model of Collaboration offers an inclusive framework for capturing many of the factors (interactional, structural, and organizational) that influence team functioning. This model proposes the rationale that interactional
determinants alone (knowledge of roles, good communication skills, and collaborative attitudes) will not necessarily improve or sustain teamwork and patient outcomes if organizational supports are not aligned in practice environments (D’Amour & Oandasan, 2005).

Formalization and governance dimensions define the organizational determinants in this model. Formalization refers to the documented procedures, protocols, checklists, and systems promoting information exchange that support desired outputs (e.g. team processes and patient outcomes). Moreover, formalization clarifies a team member’s responsibilities and what to expect from each other on the team. Governance pertains to the leadership functions that support teamwork and ensures that there is a clear and explicit direction towards collaboration between professions. Governance provides support for innovation and connectivity for ongoing adjustments to team conflict (D. D’Amour, Goulet, Labadie, Martin-Rodriguez, & Pineault, 2008).

Using this model to understand the multidimensional interaction, researchers have shown that successful teamwork is influenced by organizational supports such as, access to resources, administration commitment, leadership, formalization tools, and systems for information exchange (Agarwal, 2008; Chung, 2012; Narasimhan, 2006; Vazirani, 2005). This framework infers that organizational factors play a key role in fostering and sustaining effective teamwork. Without organizational structures and systems in place, healthcare professionals may “retreat back to traditional approaches of parallel practice” (Cashman, 2004).
Four-factor theory of innovation.

To further explore the organizational dimension of collaboration and teamwork, the Four-factor Theory of Innovation (West, 1990) was selected to complement The Structuration Model of Collaboration. The Four-factor Theory of Innovation provides a suitable conceptual lens to view organizational climate. Based on extensive review of the literature on climate and innovation, this model proposes that group innovations are the outcome of the team’s climate which is comprised of four key elements: vision, participatory safety, task orientation, and support for innovation (West, 1990). Innovation is the implementation of new and improved ways of functioning (i.e., interprofessional teamwork).

More specifically, innovation is defined as “the intentional introduction and application within a job, work team or organization of ideas, processes, products or procedures which are new to that job, work team or organization and which are designed to benefit the job, the work team or the organization” (West & Farr, 1990, p. 9). Studies have shown a pattern of climate factors associated with innovativeness. In order to operationalize these constructs, Anderson and West developed the Four-Factor Theory of Innovation to better understand team climate (shared perceptions of organizational policies, procedures, practices) as it relates to improved team performance. In order to operationalize theory constructs, the authors developed a 38-item Team Climate Inventory (TCI) to measure climate (e.g., values, team commitment, and degree of support). The hypothesis is that these four factors (vision, participatory safety, task orientation, and support for innovation) are predictive to innovativeness and behavior change (Anderson, 1994).
Vision refers to the clear, motivating objectives for which all team members highly value and show their commitment. It is critical that the vision is understandable and realistically attainable. Participatory safety is the interaction and participation between interprofessional team members in a non-threatening environment. Task orientation is a shared commitment to exceptional patient-centered task performance. Support for innovation refers to the embracement and support of implementing new and improved ways of doing things (West, 1990).

According to organizational change theory, climate can impact the success of introducing new procedures/initiatives to enhance team functioning. The Four-Factor Theory of Innovation helps recognize and interpret the relationship between team climate and team effectiveness in the worksite. This framework offers strategies for successful implementation of innovations such as adopting formalization tools and new leadership styles to facilitate effective teamwork. A recent systematic review (Korner, 2016) explored the relationship of organizational climate with interprofessional teamwork in chronic care environments. Nearly all of the studies using organizational interventions showed improved team functioning (Clarke, 2010; Sinclair, 2009; Suddick, 2007). In additional studies, researchers found that organizations who valued and supported strong leadership, resources for informational exchange, formalization tools, flexibility, and human resource development, also yielded a positive association with collaborative teamwork (Brazil, 2010; Howard, 2011; Rask, 2007; Strasser, 2005).
The most productive analytical frameworks are often those which integrate different approaches to make logical sense of the relationship between studied variables. The Structuration Model of Collaboration and the Four-Factor Theory of Innovation are strong empirical-based frameworks based on well formulated bodies of knowledge - organizational change theory and organizational sociology. Both frameworks recognize the complexity of the phenomenon and provide a multi-layered perspective of team behavior. Both frameworks help understand what transpires in the working lives of interprofessional teams and serve as reasonable models for unraveling the determinants of interprofessional teamwork. In contrast to the other frameworks in the literature which conceptualize interprofessional teamwork and collaboration in health care, the Structuration Model of Collaboration and the Four-Factor Theory of Innovation offer a pragmatic, multifaceted approach to understanding the dynamics of interactional and organizational factors which influence team performance.

Organizational determinants of teamwork.

Much attention has been placed on the interactional factors (willingness to collaborate, trust, communication, collective decision-making and interdependency) which facilitate interprofessional teamwork. However, this dissertation proposes successful teamwork (e.g., high functioning teams and positive patient outcomes) may be attributed to not only proficient interactional skills and behaviors, but conditions within the organization. San Martin-Rodriguez’s review of the literature in 2005 yielded very little empirical work on the impact of organizational determinants on teamwork. Since then, few studies have shown relationships between organizational determinants such as
governance and formalization with effective collaborative teamwork. In the qualitative literature, formalization tools such as conflict resolution protocols (Brown, 2011), secured meeting times (Gaboury, 2009; Rutherford, 2004), patient-related information sharing, and feedback systems (Gaboury, 2009) were perceived to strengthen teamwork and interprofessional dynamics. A qualitative study by Suddick and De Souuza (2007) also found that shared work practices, IP team meetings, established guidelines, etc., influenced team functioning.

A 2012 systematic review of 37 qualitative studies looked specifically at organizational determinants of interprofessional collaboration between complementary and alternative medicine (CAM) providers and biomedical (BM) doctors (Chung, 2012). The researchers used D’Amour’s Structuration Model of Collaboration to synthesize their findings. Organizational determinants such as governance (clear direction, motivational incentives, supportive leadership) and formalization (referral protocols, feedback mechanisms, designated meeting times) were perceived as prerequisites to successful teamwork. The emerging themes from Chung’s review support the hypotheses generated for this study.

Qualitative studies allow the researcher to examine and understand the patterns and themes that emerge from describing the complexity of teamwork. The strength of this design is it offers an in-depth analysis of the phenomenon being studied. Nonetheless, study findings might be unique to the small sample interviewed or observed, thus limiting generalizability and systematic comparison. Furthermore, there is still the question to what degree do these organizational variables relate to team functioning and patient outcomes?
Since 2005, a small but growing number of quantitative studies have underscored the impact of formalization tools such as electronic medical records (EMRs) (Howard, 2011), multidisciplinary rounds (Vazirani, 2005), and patient goal sheets (Phipps, 2007, Agarwal et al., 2008; Narasimhan, 2006) as instrumental in supporting team functioning. Three studies evaluated the perceived effects of formalization tools on collaborative behavior within intensive care units (ICU). Agarwal, et al. (2008), Phipps & Thomas (2007), and Narasimhan et al. (2006) all used longitudinal pre-post study designs to evaluate the impact of a daily patient goal sheet on interprofessional communication, knowledge and understanding of patient goals, and length of stay (LOS). The former study took place in a pediatric ICU, Narasimhan’s research was conducted in a 16-bed medical ICU, and Phipps & Thomas’ study investigated 26 multidisciplinary critical care units. In all studies, nurses and physicians were surveyed before and after implementation of daily patient goal sheets on the unit. The work conducted by Narasimhan et al. (2006) also incorporated multidisciplinary rounds to enhance information exchange. The adoption of these formalization tools improved communication between health providers and supported understanding of common goals for the patient – critical determinants of interprofessional teamwork.

An increasing number of hospitals are introducing multidisciplinary rounds in an effort to improve collaboration and teamwork. A two-year experimental study conducted on a medical inpatient unit in California evaluated the impact of a multidisciplinary intervention on communication and collaboration among
physicians and nurses (Varzirani, 2005). Along with the daily multidisciplinary rounds, the intervention unit also consisted of a nurse practitioner and a hospitalist medical director (governance). Surveys were administered to assess communication and collaboration between physicians and nurses on the two units. Physicians on the intervention unit reported significant higher overall collaboration with nurses than those on the control unit (n= 378 surveys; overall collaboration μ score: 63.4 vs.51.9, p=.001). Interestingly, nurses on the intervention unit and the control unit did not differ significantly in collaboration or communication with physicians despite the formalization approaches. Likewise, in another study, formalization tools did not make a significant positive difference in teamwork (Verhoef, 2008). In fact, there was a decrease in perceived teamwork with new communication strategies implemented on the unit.

Overall, preliminary findings on discussed studies generally suggest an association between organizational factors (formalization tools and governance) and team functioning. However, there are several limitations to consider when appraising these outcomes such as absence of control groups, lack of randomization, threats of validity on outcome measures, small sample size, and selection bias. Researchers cannot assume generalizability nor conclude cause and effect with respect to organizational factors’ impact on team functioning. Due to these limitations, the evidence is inconclusive and warrants further investigation.

*The role of organizational context.*

Empirical studies have shown that effective interprofessional teamwork is associated with a supportive organizational context (Freund, 2007; Shortell,
The organizational change literature speaks to the importance of context. Organizational context offers worksites a shared viewpoint and direction. Context encompasses both organizational climate and culture. Organizational culture directly links with the organization’s beliefs and values (i.e., what should be done, norms, and principles) (Ginsburg, 2005). The culture’s underlying assumptions are the unconscious, unspoken beliefs that are never questioned unless they are challenged; thus making this phenomenon intangible and difficult to measure. However, the organizational climate, which includes the “practices, procedures, policies, expected behaviors and routines” (Ginsburg, 2005), is observable and can be evaluated. According to organizational change theory, the worksite’s climate can influence the success of change initiatives, such as interprofessional teamwork.

Recent studies have begun to explore the impact of culture and team climate in health care environments. Howard (2011) focused on organizational and cultural predictors of team climate. The purpose of this cross-sectional study was to determine how organizational culture influenced the team climate (e.g., functioning of family health teams – FHTs) (Howard, 2011). Twenty-one FHTs were recruited and 628 team members of the FHTs were surveyed. The mean team climate score was 3.8 (0.6) out of a possible 5. In the multiple regression analysis, leadership score, electronic medical records (EMR) capabilities, and group developmental cultures were positively associated with higher team climate scores. Outcomes were constant across different FHT organizational characteristics. Team size or type of governance did not make a difference.
This study suggests that the organizational factors (strong leadership and use of EMRs for informational exchange) along with interactional factors (team relationships) are predictors of team climate in designated FHTs. The culture of these sites valued formalization tools and governance (leadership). This study demonstrates the significant impact of organizational context on facilitating teamwork in these FHTs.

Rask, Parmelee, Taylor, et al. (2007) conducted a multifaceted quality improvement study (along with a culture change intervention) to evaluate a falls management program (FMP) for nursing homes. A convenience sample of 19 nursing homes implemented the FMP. This program included a falls coordinator (change leader), an interprofessional team, intensive interprofessional education and training and ongoing consultation by advanced practice nurses with expertise in falls management. This was not a randomized, controlled study, but a quality improvement initiative; there are a number of confounding factors that may contribute to the outcomes. Based on the descriptive results, documentation related to the management of fall risk improved significantly during implementation of the FMP. Restraint use decreased substantially during the project period, from 7.9% to 4.4% in the intervention nursing homes (44% reduction) and decreased in nonintervention nursing homes from 7.0% to 4.9% (30% reduction). Fall rates remained stable in the intervention nursing homes, whereas fall rates increased 26% in nonintervention homes.

Key determinants in climate change included organizational leadership, a formal leader (falls coordinator), and the use of an interprofessional team. The
quality improvement project demonstrated that for falls management to succeed you need interprofessional training, organizational commitment, buy-in and support of administration/leadership, and ample quality improvement measure tools (e.g. use of flow charts, tracking records, falls assessment, etc.). This is an example of a balanced culture supporting the climate (implementation of policies, procedures, collaborative behaviors) thus facilitating interprofessional teamwork and serving as a mechanism for improved patient care.

Albeit the trend to focus on the context of healthcare settings, the question still remains does team climate, which may promote effective team functioning, influence patient outcomes? Patient satisfaction is one metric of patient outcomes in healthcare organizations, but is not considered a comprehensive measure of overall quality. Yet over the last decade, patient satisfaction has been globally used as an indicator of quality care in healthcare systems (Bower, 2003; Hann, 2007; Melerko, 2004). There is limited evidence examining the relationship between patient satisfaction and the organizational context in healthcare environments. Melerko, Mohr, and Young (2004) investigated the relationship between teamwork culture of Veterans Health Administration (VHA) hospitals and patient care satisfaction. The study sample consisted of 125 VHA hospitals for which independent and valid sources of data for culture and patient satisfaction were analyzed. Findings from multivariate regression analyses indicated a significant and positive association between teamwork culture and inpatient satisfaction scores and a significant and negative association between bureaucratic culture and patient satisfaction in hospitals. The findings of this
study are limited primarily because of response bias – staff who responded to the survey could have been committed to principles of team behavior. Patients who responded to the satisfaction questionnaire may have been more motivated to report high scores than non-respondents (Melerko, 2004). The authors concluded that hospitals should create, commit to, and support an organizational culture that emphasizes teamwork as a means to provide best practice and ensure patient satisfaction.

In 2009, Goh and Eccles systematically reviewed studies conducted within the United Kingdom (UK) that measured team climate (via TCI) and examined the association between TCI scores and quality of care measures in primary health care. Patient satisfaction was included in the quality of care measures. The authors found only eight studies that examined the relationship between these variables. Only one study found a significant association between TCI scores and patient satisfaction in patients with diabetes (Goh, 2009). Furthermore, due to study design, this sample was not representative of other primary care organizations, limiting external validity.

Finally, Hewitt et al., (2008) conducted a qualitative study that explored the patients’ perception on teamwork and its impact on their hospital experience and satisfaction. Their findings suggested that patients did not perceive teamwork as an important influence on their hospital experience. In contrast, Henry’s (2013) qualitative study showed patients did perceive team interaction as important to their quality of care.
Based on the results of this review, the relationship between organizational context (team climate) and patient outcomes (patient satisfaction) remains unclear and further research is required to validate this area of interest.

**Influence of interprofessional education and training.**

Interprofessional education (IPE) and training are believed to be essential components in cultivating interprofessional teamwork and collaboration in the workplace, and improving patient safety outcomes (Brock, 2013; O'Leary, 2012; Weaver et al., 2014). Interprofessional education is defined as the “occasion when two or more professions learn with, from, and about each other to improve collaboration and the quality of care” (CAIPE, 1997). IPE is a complex process of learning experiences which involve professional role identity, group and interpersonal skills, conflict resolution and management skills. This interactive learning process stretches from pre-licensure education (university-based) to the hospital and the community. Hospital-based IPE can be viewed as examples of the Structuration Model of Collaboration’s governance and formalization dimensions. Formalization clarifies team member’s responsibilities and what to expect from each other on a team. Governance is also central to IPE; it pertains to the leadership and support for innovation and connectivity of shared goals and vision.

Team training, a method of IPE, is a well-planned, evidence-based, interactive approach designed to increase team members’ knowledge, skills, and attitudes on teamwork principles (e.g., effective communication, coordination, leadership, role clarity, mutual support, and situational awareness). Team training was formally established in 2013 as a leading patient safety initiative in
acute care settings (Weaver et al., 2014). It is a systematic teaching approach that includes content, tools, and various delivery methods to address teamwork competencies (Weaver et al., 2014). Recent studies show champions in the science and education of teamwork are customizing team-training programs to better meet the increasing demands for effective team performance in their setting.

In several studies, behavior-based training interventions have had a positive effect on team functioning and clinical outcomes (Delise, 2010; Figueroa, 2013; Forse, 2011; Neily, 2010). In 2014, researchers conducted a systematic search specifically examining studies of team-training interventions in acute settings published within the last 10 years. Study outcomes included patient outcomes, quality indices, teamwork behaviors, knowledge and attitudes (Weaver et al., 2014). Overall, the behavior-based interventions improved team communication and collaboration.

Weaver found that team-training outcomes were also associated with improvements in patient outcomes. Ten out of 13 studies evaluated the impact of team training and reported statistically significant improvement in patient safety outcomes across a range of clinical sites. The findings concluded that there is moderate to high-quality evidence on the positive influence of team-training interventions on team-functioning and patient outcomes. Studies that identified “bundling interventions” (interprofessional team training with active learning methods plus organizational interventions to support real time
collaborative practice), proved to be the most robust evidence to support interprofessional teamwork (Weaver et al., 2014).

In contrast to previous team training studies, Sehgal (2008) did not find an effect on patient outcomes. The 4-hour interprofessional team training intervention resulted in greater perceived team functioning and communication by the health providers but no significant impact on targeted patient outcomes. Added evidence on the effects of intensive team training programs on patient outcomes is needed.

There are different types of team training curricula noted in the literature. Training programs such as TeamSTEPPS®, Crew Resource Management (CRM), and Veterans Affairs (VA) Medical Team Training all aim to develop teamwork competencies, but vary in their instructional methods (e.g., duration, activities, & modalities). The TeamSTEPPS® program was developed by the United States Department of Defense and The Agency for Healthcare Research and Quality (AHRQ) to cultivate attitudes, knowledge, and skills that encompass teamwork. The core areas of competency are leadership, mutual support, situation monitoring and communication (AHRQ, 2006).

TeamSTEPPS® uses evidence-based training techniques, has strong psychometric properties based on several clinical settings (Brock, 2013; Jones et al., 2013; Mayer et al., 2011), and offers intensive training to mentors and coaches within the work culture. It also includes standardized measures to evaluate team-training outcomes: TeamSTEPPS® Teamwork Attitudes Questionnaire (T-TAQ), TeamSTEPPS® Team Performance Observation Tool,
and TeamSTEPPS® Teamwork Perceptions Questionnaire (T-TPQ).

TeamSTEPPS® is a comprehensive training program which can be customized to meet the needs of a particular team/setting and reliably measure the core competencies of interprofessional teamwork.

**Relevance of the Literature Review to the Study**

The aim of this dissertation is to expand on the work of previous researchers and test the two previously stated hypotheses. This review of the current literature provides a foundation for understanding the concepts (team frameworks, organizational factors, context, and team training) for this particular research. There is building evidence that interprofessional teamwork is a model of practice that has potential to promote patient-centered care and enhance quality of care. Throughout the United States, numerous healthcare sites are implementing team training programs with hopes of improving the delivery of care and patient outcomes. All that notwithstanding, team training alone does not ensure transfer of trained skills into practice. In fact, a meta-analysis study found that training intervention accounted for less than 20% of the variance in team functioning; and *organizational factors* were the primary determinant of effective team functioning (Salas, Cook, and Rosen, 2008).

Translating teamwork principles on the job remains challenging. Often, effective team-training initiatives fail in the real world. Jones et al., (2013) found that the effects of a standardized team training program decreased over time due to lack of formalization tools and leadership to support team-functioning.

According to the *Structuration Model of Collaboration* and the *Four-Factor Theory of Innovation*, teamwork outcomes are shaped by organizational supports and
context, not just interprofessional education or training. Weaver, et al. (2014) contends that team training is most effective when coupled with essential organizational factors including a strong work climate to sustain team functioning and improve patient outcomes. However, few empirical studies have provided insight into the relationship between these organizational supports (e.g., team training, team climate, and formalization tools), team function, and patient outcomes. Many studies overlook the organizational context and its effect on team functioning.
Chapter 3: Methods

Setting, Participants, and Study Design

The sample consists of healthcare providers who worked on six various work units in a large, urban academic medical hospital in the northeast. All individuals who met the inclusion criteria from medical intensive care, oncology, telemetry, medical-surgical, and acute rehab units were invited to complete the Team Climate Inventory (short version) and a questionnaire on team functioning (Brief TeamSTEPPS® Teamwork Perception Questionnaire/Brief T-TPQ) combined with questions on demographic characteristics as well as team training history.

Individual work units consisted of approximately 8-10 healthcare professions including, but not limited to: nursing, occupational therapy, pharmacy, physical therapy, medicine, physician assistant, respiratory therapy, and social work. A purposive sampling approach was used. Purposive sampling can produce a sample more representative of the population if the investigator carefully chooses teams who represent the scope of population characteristics (Portney, 2009). For this study, it was important to secure health professionals who had the opportunity to routinely interface with other professions on patient care issues. Purposive sampling provided the opportunity to choose particular units based on specific criteria yielding meaningful data.

Inclusion criteria for this study consisted of healthcare professionals who: 1) worked part-time or full-time on an inpatient care unit; 2) completed their probation period; 3) spent at least 50% of their time on direct care within the unit;
and 4) interacted with one or more health professionals outside of their discipline routinely. Initially, designated work unit managers were contacted to assess interest and feasibility in conducting this study on their service. A study site liaison, identified by the unit manager, was designated from each hospital unit to distribute and collect surveys.

During team meeting on each hospital unit, health providers received surveys and a demographic form. They also received a cover letter (see Appendix H) introducing the primary investigator, relevance of the study, a request for their participation in completing a 10-minute questionnaire, the risks and benefits, withdrawal, how findings will be used, and researcher’s contact information. Health providers were assured that participation was strictly voluntary and survey data remains confidential. No personal health information (PHI) or subject identifiers was collected, reviewed, or recorded by study personnel. This research methodology posed minimal to no risk to the participant. Completing the survey implied that the participant gave consent to the questionnaire, although the participant had the option to stop at any time. When reading the cover letter, any questions health professionals had regarding the study were answered.

Patient satisfaction survey data (patients’ perceptions on their hospital experience) was ascertained by the hospital’s Integrated Patient Satisfaction Survey which included the Hospital Consumer Assessment of Healthcare Providers and Systems Survey (HCAHPS) and Press Ganey survey questions. This is existing data that is routinely collected by the Office of Patient Experience
with the support of an approved survey vendor (Press Ganey) for the hospital. A retrospective review of this de-identified data analyzed patients’ perceptions on how well staff worked together and overall care they received during their hospital stay. Demographics from the satisfaction survey responses were collected and analyzed.

In order to follow the standards of protection for human subjects, the research proposal was submitted to the Rutgers University Institutional Review Board (IRB) and to the Thomas Jefferson University Hospital IRB. Neither IRB recommended any significant changes to study protocol. No recruitment activities, data collection, or analysis occurred until both IRBs had approved the proposed study. All participants had access to the principal investigator during the study. Confidential information gathered from the survey was transferred and kept on a separate coding sheet to ensure confidentiality. Data was kept in separate, secured locations.

Variables and Operational Definitions

**Organizational supports and interprofessional team functioning.**

**Hypothesis 1:** As organizational support for interprofessional healthcare team functioning (interprofessional teamwork) in a hospital unit increases, interprofessional teamwork in that hospital unit improves.

The dependent variable in Hypothesis 1 is *interprofessional healthcare team functioning (interprofessional teamwork)*. This dependent variable was measured by a published survey: Brief TeamSTEPPS® Teamwork Perception Questionnaire (Brief T-TPQ). The Brief T-TPQ is an ordinal tool used to assess health professionals’ perceptions of interprofessional teamwork within an
organization. It is a self-report measure of teamwork within a unit or department. The Brief T-TPQ is based upon the core components of teamwork: team structure, leadership, communication, mutual support, and situation monitoring. Scoring is done by computing the average score of each construct and overall mean.

Hypothesis 1 looked at three key organizational supports for interprofessional teamwork (team climate, team training, and communication strategies). Each organizational support for interprofessional teamwork served as an independent variable and separately correlated with interprofessional team functioning.

**Hypothesis 1a.** As hospital unit team climate improves, interprofessional teamwork in that hospital unit improves.

**Hypothesis 1b.** As team training exposure in a hospital unit increases, interprofessional teamwork in that hospital unit improves.

**Hypothesis 1c.** As the use of communication strategies on the hospital unit increases, interprofessional teamwork in that hospital unit improves.

The variable “team climate” includes the practices, procedures, polices conducted in a work environment. Team climate refers to the expected behaviors and routines observed in the hospital unit. As previously described, team climate encompasses four key elements: vision, participatory safety, task orientation, and support for innovation. The organizational support of a strong team climate may positively impact team performance. The second independent variable, team training, is designed to increase team member’s knowledge, skills
and attitudes within the workplace, hypothetically supporting interprofessional teamwork. And finally, the variable “communication strategies” is an essential formalization tool which includes team huddles, interprofessional rounding, handoffs, EMRs, SBAR (Situation Background Assessment Recommendation), team conferences, and check-back strategies. These communication methods between team members may influence perceived team functioning. Data on communication utility was retrieved from study’s demographic form.

**Interprofessional team functioning and patient satisfaction.**

**Hypothesis 2.** As interprofessional healthcare team functioning (interprofessional teamwork) in a hospital unit improves, patient satisfaction with that hospital unit improves.

In Hypothesis 2, interprofessional healthcare team functioning (interprofessional teamwork) becomes the independent variable and the dependent variable is patient satisfaction. A primary question in the Team training and IPE literature is: *Does interprofessional teamwork positively influence patient outcomes, namely patient satisfaction?* Patient-reported data on satisfaction was collected using an integrated patient satisfaction survey which included Press Ganey questions and the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. The HCAHPS is a standardized survey of patients’ perspectives on their experiences during a hospital stay that enables the hospital to gauge performance as compared to state, regional and national benchmarks. It is routinely collected by the hospital. Press Ganey is an independent vendor who partners with health organizations to capture the voice of the patient through analysis of systematic and scientific
survey measures. No data collection from patients specific to this study was collected.

**Instrumentation, Procedures for Data Collection, Reliability and Validity**

Measurement of hospital unit climate as perceived by the healthcare workers was conducted using the 14 item short version Team Climate Inventory (TCI-14) (Kivimaki, 1999)(See Appendix C). As previously described, the TCI highlights the markers of team climate – vision, participative safety, support for innovation and task orientation. Participants answer inventory items using a 5-point Likert scale from "strongly disagree" to “strongly agree”, “not at all” to “completely”, and “a very great extent” to “a very little extent’ in which the higher scores indicate a better or more desirable team climate.

This instrument has acceptable reliability and validity as tested in a number of hospital settings internationally (Kivimaki, 1999; Strating, 2009). The hospital unit’s TCI-14 results were analyzed separately. For each of the four scales, mean scores were calculated across all items for each participant and then aggregated across respondents within the practice team as compared to the wider climate literature. An aggregate score is necessary for the TCI-14 because the conceptual basis of this instrument is designed to measure the “shared” perceptions of climate within the work unit. Aggregate team scores represent the overall team view of effectiveness.

An expert panel of researchers and providers customized the second survey which is comprised of questions from TeamSTEPPS® instrument: Brief Teamwork Perception Questionnaire (Brief T-TPQ) (Castner, 2012). Subscales in the Brief T-TPQ include team function, leadership, situation monitoring, mutual
support, and communication. This instrument also uses a 5-point Likert scale, “strongly agree” to “strongly disagree” (See Appendix B). Scoring consists of computing an average score for each construct and an overall mean score. This survey demonstrated internal consistency reliability of .83-.94 with a total survey reliability of .93. Factor analysis was conducted to test construct validity. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .946. Discriminatory validity was demonstrated with self-esteem and control over practice (Castner, 2012).

In addition to the Brief T-TPQ and the TCI, participants completed questions addressing demographic and organizational characteristics relevant to study variables (See Appendix D).

Prior to distributing questionnaires to research sample, a small pilot study was conducted. The purpose of the pilot testing was to determine the amount of time required to complete the questionnaire and the degree of perceived difficulty with the survey process. Five experienced health professionals (3 occupational therapists and 2 nurses) agreed to complete a pilot test of the questionnaire. All participants completed each item on the instrument; average completion time was 4.85 minutes (range 2 minutes to 7.5 minutes). All participants expressed little to no difficulty understanding or completing the survey; instructions were clear and direct. As a result of the pilot, no modifications were made on the questionnaire.

In partnership with the primary investigator, a study site liaison (identified by the hospital unit manager), distributed and collected research questionnaires.
Questionnaires were dispersed between hospital units over a period of two weeks. During week one, survey instruments were delivered to Medical ICU 1, Medical ICU 2, Medical Oncology, and Acute Rehab; Week two – Medical Telemetry and Med-Surgical Cardiac. The total time spent on survey procedures, data collection, data cleaning and preparation was 6 weeks (see Table 2). During week three, a reminder call was sent to hospital unit liaisons along with a second cover letter and additional questionnaires. Data collection began week two (Medical ICU 1, Medical ICU 2) and concluded week 4 (remaining hospital units). All questionnaires were carefully checked for accuracy and missing data; errors were identified and corrected immediately. Data cleaning was conducted to ensure all data was accurately transcribed from the questionnaire to the computer database.

**Table 2. Schedule of Survey Administration**

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Survey process initiated</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td>Data collection initiated</td>
<td></td>
<td>Completed survey distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 3</td>
<td></td>
<td></td>
<td>Reminder strategies launched</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td></td>
<td></td>
<td></td>
<td>Data collection ended</td>
<td></td>
</tr>
<tr>
<td>Week 5</td>
<td>Data cleaning and preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 6</td>
<td>Data cleaning and preparation</td>
<td></td>
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</table>

To ascertain patient satisfaction of team performance and hospital experience, 3 selected de-identified items found on the Integrated Patient Satisfaction Survey were coded and analyzed by researcher. Survey data represented discharged patients from January 2015 through December 2015.
Permission had been received to use the TCI-14 and the Brief T-TPQ (See Appendices F and G).

Data Analysis

The SPSS statistical software package (SPSS, Version 23) was used to analyze study data. Descriptive statistics (e.g. means and standard deviations for continuous data, and counts and percentages for categorical data) were used to examine characteristics of the study sample (both healthcare providers and patients). Bivariate correlation analysis is an appropriate statistical method to assess the strength and direction of association between two variables. A correlational study design was used to explore the relationship between organizational supports for interprofessional teamwork and interprofessional healthcare team functioning. This study also explored the relationship between team functioning and patient satisfaction of overall care and team performance during their in-patient stay at an urban teaching medical hospital.

Researchers will often test two or more correlation coefficients (each of which is treated separately) within one study (Portney, 2009). Hypothesis 1 looked at three key organizational supports for interprofessional teamwork: team climate, team training, and communication strategies; each served as an independent variable correlated with interprofessional team functioning. Team functioning was the dependent variable in the first hypothesis and the independent variable in the second. Patient satisfaction was the dependent variable in the second hypothesis.

Once data was collected and coded, scatter plots were created for visual representation. Scatter plots initially indicated the strength of the relationships
and directions between team climate and team functioning; team training and team functioning; and team functioning and patient satisfaction. However, correlation coefficients (r) were required to statistically summarize the strength and direction of these relationships.

As earlier stated, Hypothesis 1 examined more than one correlation in this study. Since there were four variables (team climate, team-training, communication tools, and team functioning), there were three correlations of interest. Despite these multiple tests in one study, each paired observation is treated separately (Portney, 2009).

The type of scale used to measure two variables determines the appropriate type of correlation coefficient statistic. The 14 item short version Team Climate Inventory (TCI-14) and the Brief Teamwork Perceptions Questionnaire (Brief T-TPQ) are both ordinal scales. The Spearman rank-order correlation coefficient (i.e., Spearman’s rho) is a nonparametric statistic that uses ordinal-scaled data for calculation. There are two assumptions that must be met to use this statistical measure. The two variables should be measured on an ordinal, interval or ratio scale and there needs to be a monotonic relationship between the two variables.

Participants were asked on the demographic and organization characteristics form if they have participated in a standardized team training program and, if yes, rate the degree of change in practice as a result of team training (ordinal). The dependent variable in this paired observation (team
functioning, as measured by Brief T-TPQ) was also an ordinal variable. Therefore, Spearman rho was an applicable correlation to measure associations.

The variable “communication strategies”, as presented on the demographics and organizational characteristics form, is a continuous variable and team functioning is ordinal data. The SPSS analysis program, using Spearman rho, had the capabilities to calculate the association between these two variables.

Hypothesis 2 designated “team functioning” as the independent variable and patient satisfaction, measured by the Integrated Patient Satisfaction Survey, as the dependent variable. Again, since Variable X and Variable Y are ordinal scales, the appropriate correlation coefficient remains Spearman’s rank order. Intercorrelations between the three Patient Satisfaction Survey items to further examine relationships among team functioning and overall care satisfaction, were conducted. Spearman’s rho was chosen statistical analysis. A correlation matrix was used to present the correlation coefficients on each hospital unit, thus providing a valuable synopsis of data in a concise way.

Cohen’s standard was used to assess the correlation coefficient to determine the effect size, where coefficients between .10 and .29 represent a small association; coefficients between .30 and .49 represent a medium association; and coefficients above .50 represent a large relationship (J. Cohen, Cohen, P., West, S., & Aiken, L., 2003).

**Methodological Assumptions and Limitations**

There are a few methodological assumptions and limitations that were considered when interpreting study findings. This study assumed most eligible
professionals will agree to complete the surveys honestly and there will be an equal response rate throughout the hospital units. An anticipated limitation to this study is the research design. The correlational study design does not imply causation, but solely provides insights on relationships/associations between variables. Those associations identified may be challenged to interpretation. It may also be difficult to determine whether the outcome follows the independent variable in time, or stated independent variable is a result from the outcome. For instance, does team climate on the hospital unit impact team functioning or does team functioning influence team climate?

Sampling procedures may also serve as a limitation to this study. A non-probability sampling technique, purposive sampling, was implemented. A researcher must provide fair judgment to make this method of sampling relevant (Portney, 2009). Nevertheless, this approach is susceptible to procuring a bias sample. Purposive sampling, like convenience sampling, limits generalizability of findings. Another limitation of correlational methods is the variables must be linearly related to one another. When variables are not linearly related, the correlational procedures will reduce the strength of the relationship. Moreover, outliers of the data may cause the size of a correlation coefficient to exaggerate the strength of the designated bivariate relationship. And finally, the current list of demographic and organizational characteristics studied was not all-inclusive and potential relevant variables might have been omitted; therefore, extraneous factors may have impacted study outcomes.
Chapter 4: Analysis and Presentation of the Data

This chapter outlines survey response rate, demographic characteristics of the sample, characteristics on retrospective patient survey data, and overall results of analyses used to address study questions.

Response Rate to the Survey Procedure

A sample size of 87 respondents was calculated using a sample size calculator (Raosoft, 2004) to achieve a power estimate equal to .80, at alpha of 0.05 and 95% confidence level to detect a correlation coefficient ($r$) greater than 0.29 (Snedecor & Cochran, 2003). Of the 120 health professionals eligible to participate in study, 88 respondents completed and submitted their questionnaire, an overall return rate of 73.3

*Figure 1: Health professional participation flow diagram*
One questionnaire was excluded from analyses because the respondent did not complete either the Brief T-TPQ or the TCI-14. Apart from this particular questionnaire, there were very few missing data noted. Missing data were minimized by the involvement of the hospital unit liaisons.

Results

Sample Demographics

This study was done as a cross-sectional, descriptive correlational design utilizing quantitative methods. The questionnaire included a demographic and organizational characteristic form followed by two Likert-type scale instruments (TCI-14 and Brief T-TPQ) to collect health professionals’ perceptions on team climate and team functioning. Respondents were predominantly female (n=72, 81.8%) and the largest age group (57.9%, n=51) ranged from 18-34 years old. This is a well-educated sample; over 90% have a Bachelor’s degree or higher, and close to half of the respondents (47.7%) have a Master’s degree or higher. Most of the respondents have been practicing 2-9 years (n=49, 55.7%). Nineteen (21.6%) health professionals have 10-20 years of practice and 16 (18.2%) have worked over 20 years. Four respondents worked less than one year.

There was representation from 10 different medical and health disciplines. As compared to national samples on this topic, most of the respondents were nurses (n=50, 56%), followed by physical and occupational therapy respectively (n=10, 11.4%; n=7, 8.0%). Additional professions included pharmacy, psychology, medicine, recreation therapy, social work, dietary, and cardiographic technology. Table 3 shows demographic characteristics of the study sample.
Table 3. Demographic Characteristics of Respondents (n=88)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16 (18.2%)</td>
</tr>
<tr>
<td>Female</td>
<td>72 (81.8%)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>18-34</td>
<td>51 (57.9%)</td>
</tr>
<tr>
<td>35-54</td>
<td>25 (28.4%)</td>
</tr>
<tr>
<td>55-74</td>
<td>12 (13.6%)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Associate’s degree</td>
<td>4 (4.5%)</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>41 (46.6%)</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>23 (26.1%)</td>
</tr>
<tr>
<td>Doctoral degree</td>
<td>19 (21.6%)</td>
</tr>
<tr>
<td>Other (Certification)</td>
<td>1 (1.1%)</td>
</tr>
<tr>
<td><strong>Profession</strong></td>
<td></td>
</tr>
<tr>
<td>Nursing</td>
<td>50 (56%)</td>
</tr>
<tr>
<td>Physical Therapy</td>
<td>10 (11.4%)</td>
</tr>
<tr>
<td>Occupational Therapy</td>
<td>7 (8.0%)</td>
</tr>
<tr>
<td>Medicine</td>
<td>6 (6.8%)</td>
</tr>
<tr>
<td>Dietary</td>
<td>4 (4.5%)</td>
</tr>
<tr>
<td>Cardiographic Technology</td>
<td>3 (3.4%)</td>
</tr>
<tr>
<td>Recreation Therapy</td>
<td>3 (3.4%)</td>
</tr>
<tr>
<td>Social Work</td>
<td>3 (3.4%)</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>1 (1.1%)</td>
</tr>
<tr>
<td>Psychology</td>
<td>1 (1.1%)</td>
</tr>
<tr>
<td><strong>Years of Practice</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>4 (4.5%)</td>
</tr>
<tr>
<td>2 – 9 years</td>
<td>49 (55.7%)</td>
</tr>
<tr>
<td>10 – 20 years</td>
<td>19 (21.6%)</td>
</tr>
<tr>
<td>&gt;20 years</td>
<td>16 (18.2%)</td>
</tr>
</tbody>
</table>
There were two main questions driving this quantitative research; question one composed of 3 inquiries reflecting different aspects of organization support. Results are presented relative to each sub-question. Additional descriptive statistics of study variables are presented followed by bivariate correlational analyses.

*Research Question 1A*: What is the relationship between hospital unit team climate and interprofessional team functioning in hospital units?

*Hypothesis 1A*: As team climate improves, interprofessional teamwork improves.

The respondents answered questions on the TCI-14 specific to the hospital unit's climate which is comprised of four key elements: vision, participatory safety, task orientation, and support for innovation. Respondents answered questions on a Likert-type scale using a 5-point scale: 5=Strongly agree, 4=Agree, 3=Neutral, 2=Disagree 1=Strongly disagree. Comparatively, the Brief T-TPQ measured perceived team skills and behaviors using a Likert-type scale. This self-reported measure examined leadership, communication, mutual support, situation monitoring, and team structure. Table 4 shows the mean scores of all the instrument sub-scales for each hospital unit sample.
Table 4. Descriptive Statistics of Team Climate Inventory-14 and Brief TeamSTEPPS Teamwork Perceptions Questionnaire

<table>
<thead>
<tr>
<th>Instrument Subscale</th>
<th>MICU1 (n=11)</th>
<th>MICU2 (n=8)</th>
<th>Acute Rehab (n=19)</th>
<th>Cardiac (n=13)</th>
<th>Oncology (n=19)</th>
<th>Telemetry (n=18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCI-14 Vision</td>
<td>4.25 (.51)</td>
<td>4.00 (.72)</td>
<td>4.32 (.45)</td>
<td>4.01 (.66)</td>
<td>4.25 (.38)</td>
<td>4.17 (.41)</td>
</tr>
<tr>
<td>Part. Safety</td>
<td>3.84 (.82)</td>
<td>3.62 (1.33)</td>
<td>4.08 (.71)</td>
<td>4.21 (.60)</td>
<td>4.24 (.44)</td>
<td>4.18 (.54)</td>
</tr>
<tr>
<td>Task Orient.</td>
<td>3.94 (.64)</td>
<td>3.83 (.66)</td>
<td>4.13 (.71)</td>
<td>4.23 (.53)</td>
<td>4.03 (.51)</td>
<td>3.81 (.54)</td>
</tr>
<tr>
<td>Support Innov.</td>
<td>3.93 (.71)</td>
<td>3.83 (1.11)</td>
<td>4.01 (.68)</td>
<td>4.05 (.60)</td>
<td>3.94 (.98)</td>
<td>4.05 (.57)</td>
</tr>
<tr>
<td>Total TCI</td>
<td>4.00 (.56)</td>
<td>3.82 (.87)</td>
<td>4.14 (.55)</td>
<td>4.13 (.44)</td>
<td>4.14 (.31)</td>
<td>4.09 (.37)</td>
</tr>
<tr>
<td>Brief T-TPQ Leadership</td>
<td>3.95 (.91)</td>
<td>3.94 (.95)</td>
<td>4.38 (.57)</td>
<td>4.52 (.36)</td>
<td>4.57 (.59)</td>
<td>4.09 (.86)</td>
</tr>
<tr>
<td>Communication</td>
<td>4.11 (.59)</td>
<td>4.03 (.80)</td>
<td>4.35 (.67)</td>
<td>3.85 (.95)</td>
<td>4.19 (.67)</td>
<td>4.25 (.42)</td>
</tr>
<tr>
<td>Mutual Support</td>
<td>4.43 (.55)</td>
<td>4.31 (.76)</td>
<td>4.35 (.61)</td>
<td>4.65 (.39)</td>
<td>4.69 (.42)</td>
<td>4.26 (.45)</td>
</tr>
<tr>
<td>Sit. Monitoring</td>
<td>4.25 (.58)</td>
<td>4.37 (.68)</td>
<td>4.45 (.49)</td>
<td>4.40 (.51)</td>
<td>4.37 (.54)</td>
<td>4.20 (.38)</td>
</tr>
<tr>
<td>Team Structure</td>
<td>4.16 (.53)</td>
<td>4.75 (.55)</td>
<td>4.17 (.49)</td>
<td>4.58 (.48)</td>
<td>4.40 (.66)</td>
<td>4.12 (.49)</td>
</tr>
<tr>
<td>Total T-TPQ</td>
<td>4.18 (.48)</td>
<td>4.15 (.60)</td>
<td>4.34 (.51)</td>
<td>4.40 (.47)</td>
<td>4.45 (.46)</td>
<td>4.20 (.31)</td>
</tr>
</tbody>
</table>

Note. Part Safety=Participation Safety; Task Orient. =Task Orientation; Support Innov. =Support Innovation
TCI-14 and Brief T-TPQ scale 1-5

A scatter plot was created to visualize the relationship between the organizational factor team climate and team functioning, as shown in Figure 2. This scatter plot shows a positive relationship between the TCI-14 total score and the Brief T-TPQ total score. The scatter plot alone is not sufficient to adequately summarize the relationship between variables understudy. To statistically examine variables, correlation coefficients were calculated. The total TCI-14 score was significantly correlated with the total Brief T-TPQ score exhibiting a moderate to large relationship, \( r_s = .60, p \) (1-tailed), \(< .05 \) as shown on Table 5.
Figure 2. Positive association between team climate and team functioning

Table 5. Correlation among Team Climate and Team Functioning in Hospital Units

<table>
<thead>
<tr>
<th>Spearman's rho</th>
<th>TCI-14 total score</th>
<th>Correlation Coefficient</th>
<th>.603**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig. (1-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>88</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research Question 1B: What is the relationship between team training exposure and interprofessional team functioning on hospital units?

Hypothesis 1B: As team training exposure increases, interprofessional teamwork improves.

The independent variable, ‘extent to which interprofessional team training changed practice’, was attained from the demographic form of the study questionnaire. Close to one-third of the respondents (n=27, 30.7%) participated in a formal team training program (see Table 6). Team members in Medical ICU
1 and Acute Rehab showed the highest level of participation, 45.4% (n=5) and 52.6% (n=10) respectively.

Table 6. Health Professionals Who Participated in Formal Team Training Program

<table>
<thead>
<tr>
<th>Hospital Unit</th>
<th>Yes (%)</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical ICU 1</td>
<td>5 (45.4%)</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Medical ICU 2</td>
<td>1 (12.5%)</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Acute Rehab</td>
<td>10 (52.6%)</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Medical Cardiac</td>
<td>2 (15.4%)</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Medical Oncology</td>
<td>5 (26.3%)</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>Medical Telemetry</td>
<td>4 (22.2%)</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>27 (30.7%)</td>
<td>61</td>
<td>88</td>
</tr>
</tbody>
</table>

Seventy percent (n=19) of the 27 health professionals who participated in team training believed they made ‘changes in their practice to a good or great extent’ as a result of this interprofessional education opportunity. Table 7 shows the degree of changes made in practice as a result of team training.

Table 7. Degree of Changes Made in Practice as a Result of Team Training (N=27)

<table>
<thead>
<tr>
<th>Perceived change in practice</th>
<th>Frequency n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great extent</td>
<td>1 (3.7%)</td>
</tr>
<tr>
<td>Good extent</td>
<td>18 (66.6%)</td>
</tr>
<tr>
<td>Somewhat</td>
<td>7 (25.9%)</td>
</tr>
<tr>
<td>Very little</td>
<td>1 (3.7%)</td>
</tr>
<tr>
<td>Not at all</td>
<td>0 (0.0%)</td>
</tr>
</tbody>
</table>

Note. n=Health Professionals who participated in a Formal Team Training Program
A scatter plot was created to plot values of one variable, ‘extent to which interprofessional team training changed practice’ against another variable, ‘team functioning’ as measured by the Brief T-TPQ. Figure 3 illustrates a positive relationship between the two variables however, the graph pattern is difficult to interpret visually.

![Figure 3. Scatter plot representing a small yet positive relationship between extent of practice change post team training and team functioning](image)

Bivariate analysis, Spearman's rho, was conducted to examine the relationship between perceived change in practice as a result of formal team training and the dependent variable team functioning, as measured by the Brief T-TPQ. Change of practice as a result of exposure to team training was significantly related to team functioning on the hospital unit, $r_s=.35$, $p$ (1-tailed), <.05. A small to moderate association is displayed in Table 8 thus supporting hypothesis 1B; as the impact of team training exposure increases, interprofessional teamwork improves.
Table 8. Extent of Practice Change Post Team Training and Teamwork Correlation

<table>
<thead>
<tr>
<th>Spearman’s rho</th>
<th>Extent of practice Change</th>
<th>Correlation Coefficient</th>
<th>Spearman’s rho</th>
<th>Extent of practice Change</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sig. (1-tailed)</td>
<td>0.345</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total score</td>
<td>Brief T-TPQ</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>27</td>
<td></td>
</tr>
</tbody>
</table>

Research Question 1C: What is the relationship between number of communication strategies used on hospital units and interprofessional team functioning on those units?

Hypothesis 1C: As the number of communication strategies increases, interprofessional teamwork improves.

Interprofessional communication is one of the four core IP practice competency domains identified to promote teamwork across the professions and with patient/family members. Health professionals were asked who they routinely interact with (2-3 times/week) outside of their own discipline. Table 9 shows the mean scores (number of routine interactions with other disciplines) on each hospital unit. The total sample mean of interprofessional interactions routinely occurring on hospital units was 5.41 (SD 2.26).

Table 9. Routine Interactions with Other Health Professionals on Hospital Units

<table>
<thead>
<tr>
<th>Hospital Unit</th>
<th>n</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical ICU 1</td>
<td>11</td>
<td>0</td>
<td>7</td>
<td>4.36</td>
<td>2.50</td>
</tr>
<tr>
<td>Medical ICU 2</td>
<td>8</td>
<td>4</td>
<td>10</td>
<td>6.50</td>
<td>2.20</td>
</tr>
<tr>
<td>Acute Rehab</td>
<td>19</td>
<td>4</td>
<td>8</td>
<td>5.95</td>
<td>1.51</td>
</tr>
<tr>
<td>Medical Cardiac</td>
<td>13</td>
<td>4</td>
<td>10</td>
<td>6.23</td>
<td>1.69</td>
</tr>
<tr>
<td>Medical Oncology</td>
<td>19</td>
<td>1</td>
<td>9</td>
<td>5.16</td>
<td>1.69</td>
</tr>
<tr>
<td>Medical Telemetry</td>
<td>18</td>
<td>0</td>
<td>10</td>
<td>4.67</td>
<td>2.82</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>0</td>
<td>10</td>
<td>5.41</td>
<td>2.26</td>
</tr>
</tbody>
</table>

Note. n=Respondents on hospital units
Growing evidence is beginning to show that formalization tools, such as communication strategies, can enhance team performance. The independent variable for Question 1C is ‘the average number of communication strategies used by health professionals on hospital units’. The Acute Rehab respondents had a mean score of 5.79 \( (SD\ 1.93) \) followed by Medical ICU 1 who used an average of 5.45 \( (SD\ 3.14) \) communication strategies on their hospital unit (see Table 10).

As a result of team-based training interventions, health professionals have access to evidence-based communication strategies to enhance team performance. In this study, respondents were asked which strategies they used on their unit to communicate with other health professionals on patient care issues.

<table>
<thead>
<tr>
<th>Hospital Unit</th>
<th>n</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical ICU 1</td>
<td>11</td>
<td>2</td>
<td>12</td>
<td>5.45</td>
<td>3.14</td>
</tr>
<tr>
<td>Medical ICU 2</td>
<td>8</td>
<td>2</td>
<td>8</td>
<td>5.00</td>
<td>2.20</td>
</tr>
<tr>
<td>Acute Rehab</td>
<td>19</td>
<td>2</td>
<td>9</td>
<td>5.79</td>
<td>1.93</td>
</tr>
<tr>
<td>Medical Cardiac</td>
<td>13</td>
<td>1</td>
<td>12</td>
<td>5.00</td>
<td>2.80</td>
</tr>
<tr>
<td>Medical Oncology</td>
<td>19</td>
<td>1</td>
<td>8</td>
<td>4.47</td>
<td>1.92</td>
</tr>
<tr>
<td>Medical Telemetry</td>
<td>18</td>
<td>0</td>
<td>7</td>
<td>3.55</td>
<td>2.06</td>
</tr>
</tbody>
</table>

*Note.* \( n=\text{Respondents on hospital units} \)
The five most frequently used strategies were IP rounding (n=66, 75.9%), Handoff (n=56, 64.4%), Team Huddle (n=55, 63.2%), Patient Communication Board (n=49, 56.3%) and Electronic Records (n=48, 55.2%) (see Figure 4).

*Figure 4.* Frequency of specific communication tools/strategies used by respondents (n=88)

The independent variable in Question 1C was the ‘number of communication strategies used on hospital unit’. The dependent variable, interprofessional team functioning, was measured by the Brief T-TPQ. To examine the association between number of communication strategies used and team functioning, a Spearman rho correlation coefficient using SPSS applications was computed. There was no association with the number of communication strategies with the Brief T-TPQ total score, $r_s=.01$, $p$ (1-tailed), <.05. Therefore, hypothesis 1C was not supported. (see Table 11).
Table 11. Number of Communication Strategies Used on Units and Interprofessional Teamwork Correlation

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Total score</th>
<th>Brief T-TPQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman’s rho</td>
<td>No. of communication Strategies used</td>
<td>Correlation Coefficient</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td></td>
<td>.449</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>88</td>
</tr>
</tbody>
</table>

Research Question 2: What is the association between interprofessional team functioning in a hospital unit and patient satisfaction on that hospital unit?

Hypothesis 2: As interprofessional teamwork in a hospital unit improves, patient satisfaction improves.

Retrospective patient-reported data (Integrated Patient Satisfaction Survey) collected from January 2015 through December, 2015 was retrieved and analyzed to address research question 2. 957 patients (34%) returned survey questionnaires during this time period. Response rate was above the national average (34% vs. 30%). Three designated items on the Integrated Patient Satisfaction Survey were the dependent variables in hypothesis 2 and interprofessional team functioning, measured by the Brief T-TPQ, was the independent variable.

Table 12 shows the characteristics of the survey respondents who received care on designated study units (excluding acute rehab) during the year of 2015. The acute rehab unit routinely collects patient satisfaction data separately. Conveniently, the same three items, ‘How well staff worked together
to care for you’, ‘Likelihood of your recommending this hospital to others’, and ‘Overall rating of care given at hospital’, are collected post-discharge from patients who received care on the acute rehab unit. The acute rehab survey does not include individual patient demographics; hence, the ‘About You’ section is omitted.
Table 12. Characteristic Information of Satisfaction Survey Respondents 2015

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Health Rating (n=774)</td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>51 (6.6%)</td>
</tr>
<tr>
<td>Very Good</td>
<td>149 (19.3%)</td>
</tr>
<tr>
<td>Good</td>
<td>262 (33.9%)</td>
</tr>
<tr>
<td>Fair</td>
<td>226 (29.2%)</td>
</tr>
<tr>
<td>Poor</td>
<td>86 (11.1%)</td>
</tr>
<tr>
<td>Ethnic Group/Race</td>
<td></td>
</tr>
<tr>
<td>American Indian Alaska Native (n=789)</td>
<td></td>
</tr>
<tr>
<td>Not Span/Hisp/La</td>
<td>655 (96.5%)</td>
</tr>
<tr>
<td>Puerto Rican</td>
<td>13 (1.9%)</td>
</tr>
<tr>
<td>Mexican, Mexican-American, Chicano</td>
<td>2 (0.3%)</td>
</tr>
<tr>
<td>Cuban</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td>Other</td>
<td>9 (1.3%)</td>
</tr>
<tr>
<td>White (n=814)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>554 (68.1%)</td>
</tr>
<tr>
<td>No</td>
<td>260 (31.9%)</td>
</tr>
<tr>
<td>Black or African American (n=793)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>138 (17.4%)</td>
</tr>
<tr>
<td>No</td>
<td>655 (82.5%)</td>
</tr>
<tr>
<td>Asian (n=780)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>24 (3.0%)</td>
</tr>
<tr>
<td>No</td>
<td>765 (97.0%)</td>
</tr>
<tr>
<td>Hawaiian or Pacific Islander (n=788)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>No</td>
<td>788 (100%)</td>
</tr>
<tr>
<td>American Indian Alaska Native (n=789)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12 (1.5%)</td>
</tr>
<tr>
<td>No</td>
<td>777 (98.5%)</td>
</tr>
<tr>
<td>Language mainly spoken at home (n=716)</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>685 (95.7%)</td>
</tr>
<tr>
<td>Spanish</td>
<td>7 (1.0%)</td>
</tr>
<tr>
<td>Chinese</td>
<td>13 (1.8%)</td>
</tr>
<tr>
<td>Russian</td>
<td>2 (0.3%)</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Portuguese</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td>Other</td>
<td>8 (1.1%)</td>
</tr>
<tr>
<td>Highest grade or school completed (n=763)</td>
<td>June</td>
</tr>
<tr>
<td>&lt;= 8th grade</td>
<td>18 (2.4%)</td>
</tr>
<tr>
<td>Some high school</td>
<td>42 (5.5%)</td>
</tr>
<tr>
<td>High school graduate</td>
<td>232 (30.4%)</td>
</tr>
<tr>
<td>Some college</td>
<td>212 (27.8%)</td>
</tr>
<tr>
<td>4-yr. college graduate</td>
<td>114 (14.9%)</td>
</tr>
<tr>
<td>4+yrs college</td>
<td>145 (19.0%)</td>
</tr>
</tbody>
</table>

Note. Characteristics do not include patients discharged from Acute Rehab unit.
Characteristics of retrospective patient survey data showed 60% (n=462) rated their overall health as ‘good to excellent’; over 90% (n=703) were high school graduates; and one-third (n=259) graduated from four or more years of college. The respondents were predominantly White (n=554, 68.1%) and primarily spoke English in the home (n=685, 95.7%); 934 respondents answered the question, ‘how well did staff work together to care for you’. Seventy-six percent (n=709) of the respondents gave a ‘very good’ ranking (100 points). An additional 20% (n=186) rated staff’s working together as ‘good’ (75 points). 925 patients responded to the second survey item, ‘likelihood of recommending hospital to others’. 78.2% (n=723) responded ‘very good’ to this assessment item; 21% (n=152) responded ‘good’. Lastly, 927 patients responded to the third assessment item reflecting ‘overall rating of care given’. 76.4% (n=708) believed their overall care was ‘very good’; 19.4% indicated overall care was ‘good’. Table 13 shows the degree of satisfaction, by unit, on all three dependent variables.
Table 13. Frequency Distribution of Integrated Patient Satisfaction Survey Items

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>very poor 0 (%)</td>
</tr>
<tr>
<td><strong>Staff work together</strong> a</td>
<td></td>
</tr>
<tr>
<td>Rank Medical ICU 1</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Medical ICU 2</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Acute Rehab</td>
<td>1 (0.94%)</td>
</tr>
<tr>
<td>Medical Cardiac</td>
<td>1 (0.28%)</td>
</tr>
<tr>
<td>Medical Oncology</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Medical Telemetry</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
</tr>
</tbody>
</table>

**Likelihood recommending hospital** b

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>very poor 0 (%)</td>
</tr>
<tr>
<td>Medical ICU 1</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Medical ICU 2</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Acute Rehab</td>
<td>1 (0.98%)</td>
</tr>
<tr>
<td>Medical Cardiac</td>
<td>4 (1.1%)</td>
</tr>
<tr>
<td>Medical Oncology</td>
<td>2 (0.95%)</td>
</tr>
<tr>
<td>Medical Telemetry</td>
<td>3 (1.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>

**Overall rating of Care given** c

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>very poor 0 (%)</td>
</tr>
<tr>
<td>Medical ICU 1</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Medical ICU 2</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Acute Rehab</td>
<td>1 (0.96%)</td>
</tr>
<tr>
<td>Medical Cardiac</td>
<td>1 (0.28%)</td>
</tr>
<tr>
<td>Medical Oncology</td>
<td>1 (0.48%)</td>
</tr>
<tr>
<td>Medical Telemetry</td>
<td>2 (0.83%)</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
</tr>
</tbody>
</table>

*a Frequency missing = 23
*b Frequency missing = 28
*c Frequency missing = 28

To visually examine the relationship between mean Brief T-TPQ Total score and the first patient survey item, ‘how well staff worked together’, a scatter plot was created. The data points in the diagram represented each of the six hospital units under study. The mean Brief T-TPQ Total score of all hospital units was 4.28 (SD 0.13) with a range of scores from 4.15 (minimum) to 4.45 (maximum). The mean score of the survey item ‘how well staff worked together’,
was 94.0 (SD 3.38) with a range of scores from 90.3 (minimum) to 100.0 (maximum). Figure 5 shows a random pattern indicating no linear relationship between the two variables.

![Graph showing no linear relationship](image)

**Figure 5.** Near-zero association between team functioning and patient survey item #1 (staff worked together to care for you) (N=6)

Patient survey items, ‘Likelihood recommending hospital to others’ and ‘Overall rating of care given’, both demonstrated similar, non-linear relationships with the mean Brief T-TPQ total score, as manifested in scatter plot analyses.

Spearman’s rho correlations were run to statistically examine the association between each of the three patient satisfaction survey items and overall mean score of the Brief-TTPQ, along with the subscales of Brief T-TPQ. Results, as shown in Table 14, do not substantiate any significant correlation between designated patient survey items and any of the Brief T-TPQ subscales.
Table 14. Correlations among Brief T-TPQ and Patient Satisfaction Survey Items

<table>
<thead>
<tr>
<th>Spearman’s Rho</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff Worked Together</td>
<td>Correlation Coefficient</td>
<td>-.485</td>
<td>-.485</td>
<td>-.771</td>
<td>.200</td>
<td>-.319</td>
</tr>
<tr>
<td>Sig (1-tailed)</td>
<td>.328</td>
<td>.329</td>
<td>.072</td>
<td>.704</td>
<td>.538</td>
<td>.704</td>
</tr>
<tr>
<td>N = 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Recommending Hosp.</td>
<td>Correlation Coefficient</td>
<td>-.493</td>
<td>-.493</td>
<td>-.580</td>
<td>-116</td>
<td>-.309</td>
</tr>
<tr>
<td>Sig (1-tailed)</td>
<td>.320</td>
<td>.320</td>
<td>.228</td>
<td>.827</td>
<td>.551</td>
<td>.827</td>
</tr>
<tr>
<td>N = 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Rating of Care Given</td>
<td>Correlation Coefficient</td>
<td>-.486</td>
<td>-.486</td>
<td>-.771</td>
<td>.200</td>
<td>-.319</td>
</tr>
<tr>
<td>Sig (1-tailed)</td>
<td>.329</td>
<td>.329</td>
<td>.072</td>
<td>.704</td>
<td>.538</td>
<td>.704</td>
</tr>
<tr>
<td>N = 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 = Mean Brief T-TPQ Total.  Mean Brief T-TPQ Subscales: 2 = Leadership; 3 = Communication 4 = Mutual Support 5 = Situation Monitoring; 6 = Team Structure  *p<.05

To complete the analyses of research question two, Spearman’s rho intercorrelations were run to statistically determine the association between each of the three patient satisfaction survey items on designated hospital units. These analyses answered the questions, a) Is there a relationship between ‘staff working well together’ (team functioning) and patient’s ‘overall rating of care given’? And, b) Is there a correlation between ‘staff working well together’ and ‘patient’s likelihood recommending hospital’? Each hospital unit (Medical ICU 2, Medical Cardiac, Medical Oncology, and Medical Telemetry) was independently analyzed. Acute rehab was excluded due to missing individual-level survey data, and Medical ICU 1 was omitted due to extremely low survey response (n=4).
Tables 15A, 16A, 17A, and 18A present the descriptive statistics for study variables, all of which were measured at the hospital unit level. A correlation matrix, created for each hospital unit, summarizes the measured bivariate relationships among the three variables. ‘Overall rating of care given’ was significantly correlated with ‘staff working well together’ (team functioning) on the Medical Telemetry unit ($r_s=.74$, $p$ (1-tailed), $<.0001$) (See Table 15B). This large correlation was also found on other studied units: Medical Oncology ($r_s=.78$, $p$ (1-tailed), $<.0001$); Medical ICU 2 ($r_s=.82$, $p$ (1-tailed), $<.0001$); Medical Cardiology ($r_s=.72$, $p$ (1-tailed), $<.0001$). (See Tables 16B, 17B, 18B).

Team functioning, as measured by the variable ‘Staff worked together’, was strongly related to the survey item ‘Likelihood recommending hospital to others’ on Medical Telemetry ($r_s=.75$, $p$ (1-tailed), $<.0001$), Medical Oncology ($r_s=.76$, $p$ (1-tailed), $<.0001$), Medical ICU 2 ($r_s=.84$, $p$ (1-tailed), $<.0001$), and Medicine Cardiology ($r_s=.72$, $p$ (1-tailed), $<.0001$). Albeit no association between the Brief T-TPQ subscales and survey items, intercorrelations of the Integrated Patient Satisfaction Survey items suggest a significantly strong association between team functioning and patient satisfaction outcomes, thus supporting Hypothesis 2.
Table 15. Descriptive Statistics and Intercorrelations on Patient Satisfaction Survey Items: Telemetry Unit

Table 15A. Descriptive Statistics on Patient Satisfaction Survey Items: Telemetry Unit

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff Worked Together</td>
<td>242</td>
<td>25.00</td>
<td>100.00</td>
<td>92.46</td>
<td>15.45</td>
</tr>
<tr>
<td>Likelihood Recommending Hospital</td>
<td>238</td>
<td>0.00</td>
<td>100.00</td>
<td>92.65</td>
<td>16.83</td>
</tr>
<tr>
<td>Overall Rating of Care Given</td>
<td>240</td>
<td>0.00</td>
<td>100.00</td>
<td>91.66</td>
<td>16.44</td>
</tr>
</tbody>
</table>

Table 15B. Intercorrelations among Variables of the Patient Satisfaction Survey: Telemetry Unit

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Staff Worked Together</td>
<td>---</td>
<td>.74***</td>
<td>.74***</td>
</tr>
<tr>
<td>2. Likelihood Recommending Hosp.</td>
<td>.75***</td>
<td>---</td>
<td>.75***</td>
</tr>
<tr>
<td>3. Overall Rating of Care Given</td>
<td>.74***</td>
<td>.75***</td>
<td>---</td>
</tr>
</tbody>
</table>

Ns=not significant (p>.05), *p<.05, **p<.01, ***p<.0001

Table 16. Descriptive Statistics and Intercorrelations on Patient Satisfaction Survey Items: Medical Oncology Unit

Table 16A. Descriptive Statistics on Patient Satisfaction Survey Items: Medical Oncology Unit

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff Worked Together</td>
<td>210</td>
<td>25.00</td>
<td>100.00</td>
<td>92.50</td>
<td>14.06</td>
</tr>
<tr>
<td>Likelihood Recommending Hosp.</td>
<td>211</td>
<td>0.00</td>
<td>100.00</td>
<td>90.88</td>
<td>18.17</td>
</tr>
<tr>
<td>Overall Rating of Care Given</td>
<td>210</td>
<td>0.00</td>
<td>100.00</td>
<td>91.90</td>
<td>15.46</td>
</tr>
</tbody>
</table>
Table 16B. Intercorrelations among Variables of the Patient Satisfaction Survey: Medical Oncology Unit

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Staff Worked Together</td>
<td>---</td>
<td>.76***</td>
<td>.78***</td>
</tr>
<tr>
<td>2. Likelihood Recommending Hosp.</td>
<td>.75***</td>
<td>---</td>
<td>.79***</td>
</tr>
<tr>
<td>3. Overall Rating of Care Given</td>
<td>.78***</td>
<td>.79***</td>
<td>---</td>
</tr>
</tbody>
</table>

Ns=not significant (p>.05), *p<.05, **p<.01, ***p<.0001

Table 17. Descriptive Statistics and Intercorrelations on Patient Satisfaction Survey Items: Medical ICU 2

Table 17A. Descriptive Statistics on Patient Satisfaction Survey Items: Medical ICU 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff Worked Together</td>
<td>17</td>
<td>50.00</td>
<td>100.00</td>
<td>95.6</td>
<td>13.21</td>
</tr>
<tr>
<td>Likelihood Recommending Hosp.</td>
<td>17</td>
<td>50.00</td>
<td>100.00</td>
<td>92.64</td>
<td>17.15</td>
</tr>
<tr>
<td>Overall Rating of Care Given</td>
<td>17</td>
<td>50.00</td>
<td>100.00</td>
<td>94.12</td>
<td>14.06</td>
</tr>
</tbody>
</table>

Table 17B. Intercorrelations among Variables of the Patient Satisfaction Survey: Medical ICU 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Staff Worked Together</td>
<td>---</td>
<td>.76***</td>
<td>.78***</td>
</tr>
<tr>
<td>2. Likelihood Recommending Hosp.</td>
<td>.75***</td>
<td>---</td>
<td>.79***</td>
</tr>
<tr>
<td>3. Overall Rating of Care Given</td>
<td>.78***</td>
<td>.79***</td>
<td>---</td>
</tr>
</tbody>
</table>

Ns=not significant (p>.05), *p<.05, **p<.01, ***p<.0001
Table 18. Descriptive Statistics and Intercorrelations on Patient Satisfaction Survey Items: Medical Cardiology Unit

Table 18A. Descriptive Statistics on Patient Satisfaction Survey Items: **Medical Cardiology Unit**

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff Worked Together</td>
<td>355</td>
<td>0.00</td>
<td>100.00</td>
<td>93.17</td>
<td>13.97</td>
</tr>
<tr>
<td>Likelihood Recommending Hosp.</td>
<td>353</td>
<td>0.00</td>
<td>100.00</td>
<td>93.41</td>
<td>16.02</td>
</tr>
<tr>
<td>Overall Rating of Care Given</td>
<td>352</td>
<td>0.00</td>
<td>100.00</td>
<td>93.82</td>
<td>14.09</td>
</tr>
</tbody>
</table>

Table 18B. Intercorrelations among Variables of the Patient Satisfaction Survey: **Medical Cardiology Unit**

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Staff Worked Together</td>
<td>---</td>
<td>.72***</td>
<td>.69***</td>
</tr>
<tr>
<td>2. Likelihood Recommending Hosp.</td>
<td>.72***</td>
<td>---</td>
<td>.87***</td>
</tr>
<tr>
<td>3. Overall Rating of Care Given</td>
<td>.69***</td>
<td>.87***</td>
<td>---</td>
</tr>
</tbody>
</table>

*Ns=not significant (p>.05), *p<.05, **p<.01, ***p<.0001*
Chapter Summary

In this chapter, results from a descriptive correlational study were presented. Demographic data and characteristics of the study sample were reported. Analyses were used to explore the relationships between the independent and dependent variables. Results show that team climate was significantly associated with team functioning on hospital units, thus supporting Hypothesis 1A - as team climate improves, interprofessional teamwork improves. A small to moderate association was found to support Hypothesis 1B - as the impact of team training exposure increases interprofessional teamwork improves. Relationships could not be found to confirm a correlation between number of communication strategies used on hospital units and team function. Therefore, study outcomes did not support Hypothesis 1C. And lastly, Hypothesis 2 was supported from the patient’s perspective – as interprofessional team functioning in a hospital unit improves, patient satisfaction improves.
Chapter 5. Discussion, Conclusions, and Recommendations

Interprofessional teamwork is considered to be critical in providing safe, patient-centered, quality care. Stakeholders believe that team-based practice improves clinical and patient outcomes. Yet, many overlook the organizational context and its influence on team functioning in the healthcare setting. The purpose of this research was to investigate the relationship between organizational supports (e.g. team climate, team-training, communication strategies) with team functioning and patient satisfaction in an urban medical teaching hospital. Chapter 5 will summarize and interpret the key associations found in the study, discuss the results and findings as they compare to prior enquiry, and consider the implications for practice, management, and future research. Findings are discussed relative to each of the four research hypotheses proposed. Study limitations, conclusions, and recommendations will be presented.

Summary of Findings and Discussion

Invited healthcare professionals, who worked on one of six hospital work units in a large, urban academic medical system, participated in this quantitative study. Respondents completed the Team Climate Inventory (short version), Brief TeamSTEPPS® Teamwork Perception Questionnaire, and a demographic profile. Eighty-eight out of 120 eligible respondents completed and submitted the survey instrument; a 73.3 percent response rate. Survey instruments created for healthcare professionals are typically characterized by low response rates (Cho, 2013). Response rates (RR) from 60% to 80% of a sample are considered
excellent (Portney, 2009). Based on a meta-analysis of studies seeking to improve survey RR among healthcare professionals, researchers found the overall estimated survey RR was 0.53 (Cho, 2013). Our study was notably higher than the published response rate for healthcare providers. One explanation for the acceptable level of participation is the arising interest among health professionals and hospital administrators to use new models of care. The higher response rate from this sample may be indicative of their vested, shared interest in the research topic. Another potential reason for the respectable response was the role of the ‘study site liaison’. The liaison was a trusted member of the unit culture and followed-up/reminded co-workers to complete surveys in a timely fashion.

The research questions for this study were based on the presumption that there is a relationship between IP team functioning, organizational supports, and patient satisfaction. Developing interactional factors alone, as described by D’Amour et al. (2004), does not guarantee high functioning teams nor positive patient outcomes. The following are key findings for each hypothesis:

Hypothesis 1A: As team climate improves, interprofessional teamwork improves.

Greater insight on how organizational climate promotes IP teamwork is needed. In this sample, the mean score of the TCI-short version ranged between 3.82 to 4.14 (out of a scale of 5.0). This exemplifies a healthy team climate on each of the designated hospital units. Based on these results, respondents have a shared perception of organizational policies, procedures and practices which support safe interaction and participation between team members. On all six
hospital units examined, health professionals had a shared vision and commitment to exceptional patient-centered care (West). According to the Four-factor Theory of Innovation, these underlying values prompted team members to: a) interact; b) work collaboratively towards shared goals; and c) work towards innovation (e.g. team-related behaviors) to improve quality care (Kivimaki).

Not surprisingly, the mean scores for the Brief T-TPQ (which measures perceived team skills and behaviors) were also rated high in all sub-scales (leadership, communication, mutual support, situational monitoring, and team structure) (see Table 4). Correlation coefficients were calculated to examine the association between team climate and team functioning. Results showed a moderate to large correlation between the two variables. The results from this research agree with those in Korner’s et al. (2016) systematic review which looked at intervention studies that enhanced IP teamwork in chronic conditions. The level of evidence varied (Level IIIb-Level V); nearly all of the studies in the review showed improved team functioning. Some studies suggested that the organizational climate in hospital settings in particular influenced interprofessional teamwork (Clarke, 2010; Sinclair, 2009; Suddick, 2007).

The findings of this study align with the work of Sinclair et al. (2009), and Suddick and De Souuza (2007). Sinclair and colleagues conducted a qualitative observational study on a rehabilitation care unit to explore team climate and team interaction. By way of field observations and interviews, two key themes emerged from analysis: 1) Health providers spoke of a safe work culture where they were willing to exchange knowledge and experiences with one another, and
2) team members felt empowered to communicate and contribute to collaborative care planning and delivery, thus promoting innovation. Team members also believed their skills contributed to goal attainment (Sinclair, 2009). Comparatively, Suddick and De Souza (2007) conducted a qualitative study and found that organizational climate such as shared work practices, planned joint meetings, organizational policies, guidelines, and interprofessional team meetings, influenced team functioning.

This current study adds to the growing evidence that team climate has moderate to strong association with team functioning in sampled medical hospital units.

**Hypothesis 1B:** As team training exposure increases, interprofessional teamwork improves.

Results in this study showed that 30.7% of health professionals in the sample previously participated in a formal team training program. Interprofessional teamwork has been historically underemphasized in professional training (O'Leary, 2012). Team training is a method of interprofessional education that aims to increase team members’ knowledge, skills and attitudes on teamwork principles. This systematic approach includes content, tools, interaction, and various delivery methods to address teamwork competencies. Today, many hospitals are instituting team-training programs within their organizations (Salas & Rosen, 2013). At the time of this research, the hospital under study was in the early stages of instituting team training initiatives, thus explaining a relatively small participation rate. However, those
who did participate in team training, (19 out of 27) believed they made changes in their practice to ‘a good or great extent’ as a result of intervention. In looking at the relationship between perceived change in practice (teamwork) and formal team training, results show a small to moderate association, thus supporting Hypothesis 1.B. This is consistent with published literature which shows team training interventions enhance interprofessional teamwork (Buljac-Samardzic, 2010; Figueroa, 2013; O’Leary, 2012; Salas & Rosen, 2013; Weaver et al., 2014). In one study, researchers investigated the effects of IP teamwork training within a similar hospital setting. The 4-hour training encompassed didactics, videos, role plays to practice team-related skills, and group reflection. Team training intervention resulted in greater perceived team functioning and communication but no significant impact on targeted patient outcomes (Sehgal, 2008).

An important inquiry to consider is whether there is a significant difference in perceived team functioning between health professionals that participated in formal team training, and those who did not. In addition, future research should aim to identify the combination of variables that may influence change in practice, including formal team training intervention. Multivariate analysis should be conducted to observe the relationship between additional factors that may predict change in team-based practice.

One factor that is not clear in our study is the amount of time lapse between respondents’ participation in team training and survey completion. This could have had an impact on response accuracy, especially if training occurred in
previous work environments. Also, the specific type of training (TeamSTEPPS®, Crew Resource Management (CRM) or the VA Medical Team Training program) was not identified. This could have rendered more insight into the content quality of these diverse programs.

**Hypothesis 1C: As the number of communication strategies increases, interprofessional teamwork improves**

Enhanced teamwork and communication in healthcare systems have become the priority in reducing unintentional medical errors and poor patient outcomes (Agarwal, 2008; Narasimhan, 2006; E. Salas et al., 2008; Velji, 2008; Weaver et al., 2014). This study sought to explore the degree of interactions between disciplines, the type of communication tools used, and amount of communication strategies used on hospital units. Specifically, we were interested in assessing the relationship between team functioning and amount of communication tools used on hospital units.

In this research sample, the mean score for routine interprofessional interactions with other disciplines was 5.41; thus indicating health professionals, on average, interacted with 5 different team members at least 2-3 times a week on patient care issues. The mean range of individual hospital unit interaction was 4.36 (Medical ICU 1) to 6.50 (Medical ICU 2). Due to the nature of the ICU environment, it’s not surprising that you see the highest mean of team communication. However, Medical ICU 1 reflects the lowest mean. One explanation for this incongruity could be the small n in both units. In addition,
one respondent in Medical ICU 1 indicated that he/she did not interact with anyone outside of their own profession on a routine basis.

Results showed that a wide range of communication tools are used on sampled hospital units (see Figure 4). The five most frequently used mechanisms were IP rounding, Handoff, Team Huddle, Patient Communication Board and Electronic Medical Records. An explanation for this finding may be that there has been a culture shift evolving within the hospital as a whole. Over the last 1-2 years, hospital leadership began piloting team-building initiatives to reduce medical errors and ensure patient safety. Since the total mean score of the Team Climate inventory proved relatively high (4.05 out of 5), this may explain the high level of readiness for innovation on sample hospital units. The findings lend further support to the theoretical concepts underlying a healthy, innovative team climate. A strong team climate, as noted by these hospital units, exhibits vision/commitment to team objectives; the ability to interact between interprofessional team members in a non-threatening environment; a shared commitment to exceptional patient-centered care; and administrative/leadership support for implementing innovative, team-oriented, communication strategies (Anderson, 1994). These teams were prepared to implement innovative communication strategies in order to augment team functioning and patient outcomes.

Results showed no significant association between number of communication strategies used and team functioning (Table 11). The amount of communication tools health professionals used in their day to day practice did not
relate to their perception of teamwork on the sampled hospital units. To our knowledge, this is the first study that examined the relationship between these two variables, limiting comparison to other research. Quantity of tools used are not relevant to the practitioner as it relates to team function. A more meaningful association would have been to correlate different types of communication strategies with the Brief T-TPQ score. Only the quantity (number of strategies used) was examined, which proved statistically and clinically non-significant.

A growing number of studies have tested the effectiveness of communication strategies used among interprofessionals and its impact on teamwork. In contrast to the results found in this study, Phipps and Thomas (2007) used a pre and post-test survey design to evaluate the effectiveness of Daily goal sheets on 26 multidisciplinary critical care units. This communication strategy improved the perception of communication among interprofessional team members and improved care on the surgical unit. Two other studies (Agarwal, 2008; Narasimhan, 2006) found effects of the same communication tool (daily patient goal sheets) on interprofessional communication and patient outcomes. Additionally, Suddick & DeSouza (2007) found that the “type” of communication (e.g. use of updates, meetings, discussions) had an influence on facilitating effective teamwork. In fact, the authors postulate that communication may be one of the most crucial factors to the teamwork process. According to D’Amour’s Structuration Model of Collaboration, the formalization dimension (procedures, checklists, systems to enhance information exchange) is a key component in fostering and sustaining effective teamwork. However, there was
one study in the literature that conflicted with the theoretical assumption that formalization tools foster teamwork. Verhoef (2008) and colleagues found that by reorganizing team meeting and adopting a comprehensive electronic checklist in inpatient settings, there was a decrease in perception of team cohesion, order, and organization in inpatient settings (Verhoef, 2008).

Our study provided descriptive results on the most frequently used communication tools on the sampled hospital units. Based on published research, these communication strategies are evidence-based, and serve as organizational supports to enhance teamwork on the hospital unit. Furthermore, our research found that the ‘amount’ of communication strategies clinicians used, did not associate with team functioning.

_Hypothesis 2: As interprofessional teamwork in hospital units improve, patient satisfaction improves._

Retrospective patient-reported data (satisfaction survey items) and the results from the Brief T-TPQ were analyzed to address Hypothesis Two. Nine hundred fifty-seven patients from the sampled hospital units returned survey questionnaires during the period of January 2015 through December, 2015. Demographic results from the patient survey were presented in Chapter 4. Key descriptive findings from the survey showed that 96% of the respondents believed staff worked very well together to care for them. 99% responded ‘very good’ or ‘good’ to the survey item, ‘likelihood of recommending hospital to others’. And 95.8% of the respondents believed their overall care was ‘very good’ or good’. These frequencies suggest an extremely satisfied group of
discharged patients. Yet, these results only represent 34% of the discharged patient population from sample hospital units in 2015. External validity is compromised due to the non-randomized sampling and low response rate. Caution must be taken when interpreting these findings. To address H2, each of the three relevant patient satisfaction items were correlated with the Brief T-TPQ. Results show no significant relationship between survey items and overall mean score of the Brief T-TPQ, nor the subscales of the Brief T-TPQ. There are possible explanations for the statistically non-significant results. The methodology of using retrospective survey data has its limitations that can impact findings. All available, non-randomized data from sample hospital units were used in the analysis due to low response rates. This resulted in a homogenous group of respondents who rated staff’s working together, overall care, and likelihood of recommending hospital to others, exceptionally high. The data may reflect non-responsive bias. There are potential differences in patient experiences between the respondents and non-respondents. Survey methodology did not ensure a representative sample. Broadening the sample of health professionals and discharged patients from other hospital units who may have different experiences, could lead to greater variance in the survey results, and meaningful associations between variables.

This study originally sought to examine the health professionals’ assessment of IP teamwork and its association with patient satisfaction. However, it is important to see teamwork from the hospitalized patient’s viewpoint. To further analyze these two variables (team functioning and patient
satisfaction), we correlated the patient’s perspective of teamwork and how it relates to overall patient satisfaction. Intercorrelations were run to statistically determine association between each of the three satisfaction survey items on designated hospital units. Two of the survey items were directly linked to the study’s independent and dependent variable, but from the patient’s perspective. ‘Overall rating of care given’ (DV) exhibited a strong relationship with ‘Staff working well together’ (IV) on all 4 hospital units tested (See Tables 15A, 16B, 17B, 18B). Notwithstanding survey methodology limitations, these intercorrelation coefficients support Hypothesis 2 suggesting an association between perceived teamwork and patient satisfaction. This finding is consistent with some of the published literature which show positive associations between IP teamwork and patient satisfaction (Goh, 2009; Melerko, 2004; Newman, 2005). One study, with similar objectives but on a larger scale, investigated various hospital cultures and patient satisfaction. Results from a multivariate regression analyses found that out of 4 types of cultures, cultures that supported teamwork had the strongest association to inpatient satisfaction scores (Melerko, 2004).

Our results differed from Hewitt’s et al. (2015) research findings. Hewitt’s qualitative work explored the patient’s perceptions of good and poor teamwork and its impact on the hospital experience (satisfaction). This study went beyond analyzing one survey item on teamwork, but through in-depth semi-structured interviews, positive and negative indicators of teamwork were identified. One significant theme from the interview was patients did not identify ‘teamwork’ as a
priority. Patients paid attention to the interventions they received and not the underlying processes that supported team-based care (Hewitt, 2015). Patients were more interested in the outcomes of team functioning and had difficulties perceiving the impact of teamwork on their personal experience. In contrast, another qualitative study explored patients’ views of teamwork-related behaviors observed during an emergency department visit. The results indicated that based on direct observations, patients do make assumptions about team functioning and the quality of care provided (Henry, 2013). Patients did care about team interactions they observed in the hospital setting.

The question remains, does teamwork influence the patient experience and level of satisfaction? The results of this research suggests there is a positive relationship between teamwork and patient’s satisfaction with overall care, however, further study is needed.

**Implications for Practice**

This correlational study informs health practitioners about the significance of having a supportive work climate to enable effective, interprofessional teamwork within in a medical teaching hospital. Based on the descriptive findings, we found that interprofessional teamwork is associated with responsive environments that promote shared values, team commitment, and support for innovation (constructs described in the Four-Factor Theory of Innovation). In this study, the organizational context was the underlying factor for which interprofessional teamwork evolves. Healthcare teams must recognize that interactional skills alone will not enhance nor
sustain effective team functioning if the organizational climate is not supportive. This new evidence adds to the theoretical underpinnings of the Structuration Model of Collaboration which emphasizes the role of governance and formalization (organizational dimensions) in fostering teamwork and collaboration.

This current study highlights some of the benefits of team training programs (e.g. changing practice). A small to moderate association between team functioning and formal team training was observed. Seventy percent of the team training participants changed their practice as a result of formal training. Interprofessional staff should take the opportunity to learn, practice, and role play evidence-based communication strategies via standardized team training workshop. As reflected in our findings, high-functioning teams working in healthy, team-oriented cultures, and routinely interacted with at least 4 other team members outside of their discipline. These hospital units used a variation of communication strategies. Based on these findings, one can postulate that it's not the 'amount' of tools used' that support teamwork, but the quality and value of the tool for that particular work climate. Standardized team training programs and published literature offer professionals the tools and strategies to support team-based skills and behaviors. Further research is warranted to continue to evaluate the effect of specific communication tools on team functioning and patient outcomes.

Health professionals should recognize the importance of procuring the patient's viewpoint of team-based behaviors. There is a gap in our
understanding of teamwork from the patient’s perspective. Hewitt et al. (2015) recommended that healthcare teams become more explicit with patients regarding team collaboration. Teamwork should be visible to the patient. More importantly, the patient should be an integral voice and pivotal member within the healthcare team. Team functioning and team processing should be more apparent to all members. This data shows that teamwork from the patients’ perspective is strongly associated with their overall patient satisfaction. Since this is a critical outcome measure, clinicians should be aware of the influence and quality of interprofessional communication demonstrated on the units, bedside, labs, and gyms. One recommended strategy from the TeamSTEPPS® literature suggests teams regularly review their team performance in order to improve communication (AHRQ). Debriefing involves brief informal information exchange and feedback to analyze and discuss lessons learned from a team-related, patient-care event. These team-based debriefing sessions are designed to improve teamwork and patient outcome (including satisfaction).

Implications for Management

The results from this study have implications for hospital administrators, managers, and team leaders who are seeking to understand the relationships between IP teamwork, organizational supports, and patient outcomes. Patient satisfaction, which this study examines, continues to be an important outcome. It is the first dimension of the Institute for Healthcare Improvement’s Triple Aim - improving the patient experience of care. There is limited evidence that good
interprofessional team functioning results in better patient experience as measured by patient satisfaction surveys. Our study first looked at the perception of teamwork from the health professionals’ perspective. There was no significant relationship between teamwork and patient satisfaction. However, we continued to investigate the relationship between these variables, from the patient’s perspective. Using the HCAHPS scores to correlate team function and care satisfaction, we found a positive relationship on all sampled hospital units. Data collected from the HCAHPS, (communication skills, interpersonal care, and team performance), has the potential to assist hospitals and administrators on improving team functioning and clinical outcomes. Patients’ feedback on care delivery and team processes could lead to potential areas for improvement through team training.

This study contributes to the growing evidence that team training has an association with improved clinical processes and patient outcomes. Hospital leaders are wise to invest in formal team training programs. Most healthcare providers graduate from professional schools without any formal team training on IP collaboration and communication. To address this knowledge gap, there is a trend to implement IP teamwork training programs throughout hospital systems (E. Salas et al., 2008). However, once practitioners are trained, management must ensure that the work climate is healthy enough to sustain innovation and organizational change. Each of the six hospital units in this study demonstrated good mean scores for each of the four key elements in the TCI-14. Based on these findings, respondents viewed their hospital unit as a safe, non-threatening
environment that promotes team interaction and collaboration. Health professionals felt supported with implementing new procedures/initiatives (e.g. new communication strategies). Their environments included formalization tools which promoted information exchange and enhance team performance. Descriptive findings in this research offer management and team leaders an array of communication strategies that were frequently used in this medical hospital. This study serves as a case example for hospital leaders on the importance of a good, supported team climate as it relates to improved team functioning.

**Implications for Future Research**

The data from this research sets the stage for next step expansion, with recommended modifications. Findings from this study indicate that the sampling methodology produced little variance in outcomes. All six hospital units exhibited high ratings of team climate and perceived teamwork. Future studies examining the relationship of stated variables, should expand and include additional hospital units and other matched hospital settings outside of this network. More data will yield a better representation of both health professionals and discharged patients from respective units. A greater ‘n’ could allow for pre/post intervention designs and comparisons.

Interprofessional teamwork is a complex dynamic relationship between multiple individuals who share team identity and work closely together for the good of the patient. Measuring the elements of teamwork is quite challenging. There are a number of methods to measure teamwork in the literature: self-reported questionnaires (as in this study), peer assessment, direct observation,
and measurement of the outcome of effective teamwork (O'Leary, 2012). Direct observation is favored over self-reported instruments thus controlling potential response and/or reference bias. A few studies have shown that direct observation provides more accuracy of team-related behaviors (Frankel, 2007; Malec, 2007). Future studies could examine teamwork on the hospital unit using a standardized observation tool that identifies behaviors related to the core competencies of teamwork. Observation scores can be correlated with TCI-14 scores to assess relationship between the variables.

The HCAHPS is the first standardized patient satisfaction survey documenting the patient care experience in the hospital. There is little evidence on the impact of teamwork on patient satisfaction and specifically how the patient perceives teamwork in the hospital. There is only one item on the HCAHPS/Press Ganey (e.g. Integrated Patient Satisfaction) questionnaire that directly asks about team functioning as it relates to individual care. Although our study showed a strong relationship between teamwork and satisfaction, the instrument did not fully measure all components of team function. Future studies should focus on measuring the patients’ understanding of teamwork and how team functioning impacts their care experience. A mixed method approach would provide greater understanding and explanation on themes discovered. By engaging patients in the assessment process, we heighten our insight into what’s valuable to the patient.

Experts in the field agree that direct observation provides a more accurate appraisal of team-related behaviors using informed observers (O'Leary, 2012).
new instrument to observe teamwork behaviors is currently being tested in the same hospital as this study was conducted. The Jefferson Teamwork Observation Guide (JTOG) was originally created for pre-licensure students early in their educational program to observe interprofessional teams in action (Lyons, 2016). The tool has established reliability and validity to assess health professionals in practice. Currently, the research team is developing and testing a ‘patient JTOG’. Patients will have the opportunity to assess team performance of their care providers in real time.

Additional recommended research enquiries, based on this exploratory study, would include:

A) Examine the underlying reasons why teams choose particular modes of communication tools for information exchange on their unit

B) Look at current data to test if there are statistical differences in perceived teamwork between those who participated in formal team training and those who did not.

C) Conduct qualitative research to understand the role and supports needed by the team leader to sustain high functioning teams on the hospital unit.

D) Evaluate the effects of Team Training programs on Team Climate and patient outcomes. Is there a significant difference post intervention?

E) Examine and compare the effects of different models of Team Training on team performance and patient outcomes

**Limitations**

The design of this study was both a support and a limitation. Correlational research does not imply causation but solely provides insights on relationships
between relevant variables. The study’s sampling procedures would be considered a limitation as well. A purposive sample was used to recruit participating hospital units. Despite the benefits of using purposive sampling, this method has the risk of researcher bias and limits generalizability of findings. In addition, hospital units were only drawn from one teaching hospital. The sample size of 6 hospital units, ranging from 8 to 19 respondents per unit, was a limitation, reducing power analysis and increasing the possibility of yielding type II error. In some instances, (Hypothesis 1A, 1B, 1C), the small sample size prohibited correlation analysis at the individual hospital unit level. In Hypothesis 2, a greater number of health professionals (respondents) on the individual hospital unit level could potentially allow for significant association between IP teamwork and patient satisfaction. Despite small samples, findings remain consistent. Overall, a randomized, multi-centered study would have strengthened the ability to generalize results.

Although standardized instruments were used to measure study variables, the HCAHPS/Integrated Patient Satisfaction Survey had content limitations. The survey was limited to only one item pertaining to ‘teamwork’. This tool didn’t address all components of team performance observed on the hospital units, thus limiting rich data on the patient’s perspective of team functioning. One might argue the instrument’s content validity is weak as it pertains to measuring the construct of teamwork.

Patient data from the Integrated Patient Satisfaction Survey were collected and analyzed from the hospital unit from which the patient was discharged. This
may not entirely reflect the patient’s hospital experience if he/she encountered more than one unit while in the hospital. This may be the reason why there was an extremely small survey response rate (4) in Medical ICU 1.

Using self-reported questionnaires verses direct observation may be considered a study limitation. If there was a significant time lapse between participating in a team training workshop and completing the study profile, inaccurate self-reporting (recall bias) may have occurred.

**Conclusion**

Despite four decades of research on team performance in healthcare, investigators have not determined the association between interprofessional teamwork and improved quality of care (including the patient experience), population health, and/or reduced healthcare costs. This study’s primary aim was to measure the relationship between teamwork and patient satisfaction, and determine the impact organizational factors have on supporting team functioning. This chapter summarized the results of the descriptive statistics, proposed explanations for the correlational findings, and synthesized results as they relate to previous research.

Despite limitations, the insights gained from this study have contributed to the body of knowledge asserting: 1) the need for organizational supports to enhance and sustain interprofessional teamwork; and 2) the importance of recognizing the relationship between team functioning and the patient’s experience as reflected in the Integrated Patient Satisfaction Survey. Study findings, including number and types of communication strategies used, team training outcomes, components of a healthy team climate, and ideas to engage
the patient in observing team-related behaviors, could prove beneficial in
directing clinicians, team leaders, and hospital administrators as they begin to
transform their organization’s culture. Finally, this study provides a launching
point for continued research. More rigorous testing of study variables (team
climate, team training programs, and communication strategies) and how they
interact is warranted.
References


Appendix A: Interprofessional Teamwork, Organizational Supports, and Patient Outcomes

Model of Organizational Factors-Team Process-Patient Outcome Relationships

Flow of Correlational Study
## Appendix B: Brief Teamwork Perceptions Questionnaire (Brief T-TPQ)

**Instructions:** Please respond to the questions below by placing a check mark (✓) in the box that corresponds to your level of agreement from *Strongly Agree* to *Strongly Disagree*. Please select only one response for each question.

### Leadership

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Neutral (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My supervisor/manager provides opportunities to discuss the unit’s performance after an event</td>
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<td>2. My supervisor/manager takes time to meet with staff to develop a plan for care</td>
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<td>3. My supervisor/manager considers staff input when making decisions about patient care</td>
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<td>4. My supervisor/manager models appropriate team behavior</td>
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### Communication

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<tr>
<th>Question</th>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Neutral (3)</th>
<th>Disagree (2)</th>
<th>Strongly Disagree (1)</th>
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<tr>
<td>5. Information regarding patient care is explained to patients and their families in lay terms</td>
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<td>6. When communicating with patients, staff allow enough time for questions</td>
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<td>7. Staff relay relevant information in a timely manner</td>
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<td>8. Staff verbally verify information they receive from one another</td>
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<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neutral</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
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<td><strong>Mutual Support</strong></td>
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<td>9. Staff assist fellow staff during high workload</td>
<td>5</td>
<td>4</td>
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<td>10. Staff caution each other about potentially dangerous situations</td>
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<td>11. Staff advocate for patients even when their opinion conflicts with that of a senior member of the unit</td>
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<td>12. Feedback between staff is delivered in a way that promotes positive interactions and future change</td>
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<td><strong>Situation Monitoring</strong></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neutral</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
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<tr>
<td>13. Staff exchange relevant information as it becomes available</td>
<td>5</td>
<td>4</td>
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<td>14. Staff continuously scan the environment for important information</td>
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<td>15. Staff meets to reevaluate patient care goals when aspects of the situation have changed</td>
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<td>16. Staff share information regarding potential complications (e.g., patient changes, bed availability)</td>
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<tr>
<td>Team Structure</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neutral</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
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<td>17. My unit has clearly articulated goals</td>
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<td>18. My unit operates at a high level of efficiency</td>
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<td>19. Staff understand their roles and responsibilities</td>
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<tr>
<td>20. Staff within my unit share information that enables timely decision making by the direct patient care team</td>
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### Appendix C: 14 Item Team Climate Inventory (TCI-14)

**Instructions:** Please respond to the questions below by placing a check mark (✓) in the box that corresponds to your level of agreement from *Completely* to *Not at all; Strongly Agree* to *Strongly Disagree*; or *A very great extent* to *very little extent*. Please select only one response for each question.

<table>
<thead>
<tr>
<th>Vision</th>
<th>Completely</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>Not at All</th>
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</thead>
<tbody>
<tr>
<td>1. How far are you in agreement with Team objectives?</td>
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<td>2. To what extent do you think your team’s objectives are clearly understood by other members of the team?</td>
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<td>3. To what extent do you think your team’s objectives can be achieved?</td>
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<td>4. How worthwhile do you think these objectives are to the organization?</td>
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<table>
<thead>
<tr>
<th>Participative Safety</th>
<th>Strongly Agree</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>Strongly Disagree</th>
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<tbody>
<tr>
<td>5. We have a “we are in it together” attitude</td>
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<td>6. People keep each other informed about work-related issues in the team</td>
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<td>7. People feel understood and accepted by each other</td>
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<td>8. There are real attempts to share information throughout the team</td>
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<table>
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<tr>
<th>Task Orientation</th>
<th>To a Very Great Extent</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>To a Very Little Extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Are team members prepared to question the basis of what the team is doing?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

108
10. Does the team critically appraise potential weaknesses in what it is doing in order to achieve the best outcome?

11. Do members of the team build on each other’s ideas in order to achieve the best possible outcome?

<table>
<thead>
<tr>
<th>Mutual Support</th>
<th>Strongly Agree</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. People in this team are always searching for fresh, new ways of looking at problems</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>13. In this team we take the time needed to develop new ideas</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>14. People in the team cooperate in order to help develop and apply new ideas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix D: Demographics and Organizational Characteristics

1. Profession (check one):
   - ❑ Nursing
   - ❑ Medicine
   - ❑ Physical Therapy
   - ❑ Occupational Therapy
   - ❑ Physician Assistant Studies
   - ❑ Social Work
   - ❑ Pharmacy
   - ❑ Respiratory Therapy
   - ❑ Dietary
   - ❑ Psychology
   - ❑ Other: _______________________

2. Work Unit:
   - ❑ Medical ICU
   - ❑ Acute Rehab
   - ❑ Medical Oncology
   - ❑ Medical-Surgical Floor
   - ❑ Medical Telemetry

3. Gender:    ❑ Female    ❑ Male

4. Age:
   - ❑ 18-24 years old
   - ❑ 25-34 years old
   - ❑ 35-44 years old
   - ❑ 45-54 years old
   - ❑ 55-64 years old
   - ❑ 65-74 years old
   - ❑ 75 yrs or older

5. Education: What is the highest degree or level of school you have completed? If currently enrolled, highest degree received.
   - ❑ Associate degree
   - ❑ Bachelor’s degree
   - ❑ Master’s degree
   - ❑ Professional degree
   - ❑ Doctorate degree

6. Years of Practice:
   - ❑ Less than 1 year
   - ❑ 10-20 years
   - ❑ 2-4 years
   - ❑ 5-9 years
   - ❑ Longer than 20 years

7. Years of Practice on Current Hospital Unit:
   - ❑ Less than 1 year
   - ❑ 10-20 years
   - ❑ 2-4 years
   - ❑ 5-9 years
   - ❑ Longer than 20 years

8. Which health profession do you interact with outside of your discipline routinely (at least 2-3 times/week)? (Check all that apply)
   - ❑ Nursing
   - ❑ Occupational Therapy
   - ❑ Pharmacist
   - ❑ Physical Therapy
   - ❑ Physician
   - ❑ Physician Assistant Studies
   - ❑ Social Work
   - ❑ Respiratory Therapy
   - ❑ Dietary
   - ❑ Psychology
   - ❑ Other: _______________________

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9. Which tools/strategies do you use in the unit to communicate with other health professional on patient care issues? (Check all that apply)
   - Team huddles
   - Team conference
   - Electronic Medical Records
   - ‘SBAR’
   - Check-back
   - Handoff
   - Brief
   - Debrief
   - Feedback
   - ‘CUS’
   - Two-Challenge Rule
   - Pt. Communication Boards
   - Interprofessional/multidisciplinary rounding

10. Have you participated in a Team Training Program?  
    - Yes  
    - No

10a. If ‘Yes’ To what extent have you made changes in your practice as a result of team training?

   - To a great extent
   - To a good extent
   - Somewhat
   - Very little
   - Not at all
Appendix E: Selected Items from the Integrated Patient Satisfaction Survey/Hospital Consumer Assessment of Healthcare Providers & Systems

OVERALL ASSESSMENT

1. How well staff worked together to care for you
   - 1 – very poor
   - 2 – poor
   - 3 – fair
   - 4 – good
   - 5 – very good

2. Likelihood of your recommending this hospital to others
   - 1 – very poor
   - 2 – poor
   - 3 – fair
   - 4 – good
   - 5 – very good

3. Overall rating of care given at hospital
   - 1 – very poor
   - 2 – poor
   - 3 – fair
   - 4 – good
   - 5 – very good

ABOUT YOU

27. In general, how would you rate your overall health?
   - 1 – poor
   - 2 – fair
   - 3 – good
   - 4 – very good
   - 5 – excellent
28. In general, how would you rate your mental or emotional health?
   ❑ 1 – poor
   ❑ 2 – fair
   ❑ 3 – good
   ❑ 4 – very good
   ❑ 5 – excellent

29. What is the highest grade or level of school that you have completed?
   ❑ 1 – 8th grade or less
   ❑ 2 – Some high school but did not graduate
   ❑ 3 – High school graduate or GED
   ❑ 4 – Some college or 2-year degree
   ❑ 5 – 4-year college graduate
   ❑ 6 – More than 4-year college degree

30. Are you Spanish, Hispanic or Latino origin or descent?
   ❑ 1 – No, not Spanish/Hispanic/Latino
   ❑ 2 – Yes, Puerto Rican
   ❑ 3 – Yes, Mexican, Mexican American, Chicano
   ❑ 4 – Yes, Cuban
   ❑ 5 – Yes, other Spanish/Hispanic/Latino

31. What is your race? Please choose one or more
   ❑ 1 – White
   ❑ 2 – Black or African American
   ❑ 3 – Asian
   ❑ 4 – Native Hawaiian or other Pacific Islander
   ❑ 5 – American Indian or Alaska Native

32. What language do you mainly speak at home?
   ❑ 1 – English
   ❑ 2 – Spanish
   ❑ 3 – Chinese
   ❑ 4 – Russian
   ❑ 5 – Vietnamese
   ❑ 6 – Some other language (please print)
Appendix F: Correspondence – RE: Team Climate Inventory-Short Version

Mathilde Strating <strating@bm.eur.nl>
Mon 11/17/2014 5:41 AM
Dear Tracey,
As I understood from the articles of Anderson, West en Kivimaki the TCI-14 items can be used without permission for scientific research as long as you refer to their articles and do not change the items or answer categories. In the paper of Kivimaki as well as in our paper you find the 14 English formulated items and answer categories range from 1) totally disagree to 4) totally agree. That is all you need to use the instrument.

Hopefully this answers your question.
Best regards,
Mathilde Strating

From: Tracey Earland [mailto:Tracey.Earland@jefferson.edu]
Sent: zondag 16 november 2014 01:14
To: Mathilde Strating; Anna Petra Nieboer
Cc: Tracey Earland
Subject: Team Climate Inventory-short version

Good Day Drs. Strating and Nieboer,

My name is Tracey Earland and I'm on faculty at Thomas Jefferson University, Jefferson School of Health Professions in Philadelphia, Pennsylvania. I teach in the department of occupational therapy & Jefferson's interprofessional education program. I am also a student working towards my PhD in Health Sciences at Rutgers University. My proposed dissertation topic explores the relationship between team functioning, team training and key organizational factors (specifically team climate) within various departments in an urban hospital system.

I am very interested in using the TCI short version as one of the measures in my research. I have reached out to Dr. Kivimaki to request permission to use the TCI-14 but I have not received a response as of yet. I've read studies published over the last few years that have used this instrument to measure team climate in hospital settings. The Canadian Interprofessional Health Collaborative has included the TCI short version in their ‘Inventory of Quantitative Tools Measuring IPE and Collaborative Practice Outcomes’. I recently read your article, Psychometric test of the Team Climate Inventory-short version investigated in Dutch quality improvement teams, where the TCI-14 items were published. From what I've read, I believe this instrument is a good fit for my research. However, I'm not sure how to access the TCI-14 and would very much appreciate your guidance.
Thank you Dr. Strating and Dr. Nieboer for your attention. I'm looking forward to hearing from you. My email address is: Tracey.vause-earland@jefferson.edu. My office number is 215-503-4831. Kind regards, Tracey Earland, MS, OTR/L.
Appendix G: Correspondence – RE: Brief Teamwork Perception Questionnaire

RE: Request permission to use Brief TeamSTEPPs T-TPQ
Castner, Jessica <jcastner@buffalo.edu>
Fri 5/1/2015 11:22 AM
To:
Dear Tracey,

Thank you for your inquiry. The items are all part of the public T-TPQ in the public domain, so you do not need my permission to use. I only ask that you cite the psychometric testing I had completed.

Good luck!
Dr. Castner

From: Tracey Earland [mailto:Tracey.Earland@jefferson.edu]
Sent: Friday, May 01, 2015 11:18 AM
To: Castner, Jessica
Subject: Request permission to use Brief TeamSTEPPs T-TPQ

Good day Dr. Castner,

My name is Tracey Earland and I'm on faculty at Thomas Jefferson University, College of Health Professions in Philadelphia, PA. I am currently working on my dissertation at Rutgers University looking at the relationship between organizational factors, perceived teamwork, and patient satisfaction outcomes in a medical teaching hospital. I am using a purposive sample specifically evaluating 6 work units. Some units have participated in TeamSTEPPS training, some have not.

My proposed instrument for perceived teamwork is T-TPQ. I was not aware of the Brief TeamSTEPPs tool. I happened to read about it in a recent article a couple of weeks ago. Needless to say, I was thrilled to find a shorter standardized shorter survey.

Unfortunately neither of my libraries hold a subscription to Journal of Nursing Measurement.

I have a request order in for the article.

I would like to ask you if I could use your tool in my study. If so, would kindly forward it to me. Or, perhaps the survey is published in your 2012 article.

Thank you for your attention and best to you in your future work.

Kind regards,
Tracey Earland
Appendix H: Study Cover Letter to Hospital Unit Health Providers

Subject: Questionnaire on interprofessional teamwork

Dear Colleague,

My name is Tracey Earland and I teach in the Department of Occupational Therapy at Thomas Jefferson University. I am also a graduate student at Rutgers University pursuing a PhD in Health Sciences. My dissertation focuses on the dynamics of interprofessional teamwork in the medical hospital setting.

My study involves conducting two brief surveys of interprofessionals on selected hospital units, such as yours, to gain a better understanding on the relationship between organizational supports, team functioning, and patient outcomes. Because you are a member of the (hospital unit name) team, I am inviting you to participate in this research.

Your participation will require completing two brief confidential questionnaires on perceived teamwork and work climate, and a demographic form. In total, this activity should take less than 10 minutes. Please consider filling out the surveys upon immediate receipt and submitting it directly to (name of Site Liaison) when completed.

Answering survey questions implies that you consent to the questionnaire. If you choose to participate in this study, please note participation is strictly voluntary and you may decline at any time. The information you provide in the questionnaire will remain confidential and secured in a locked file cabinet. De-identified data will be shared with my Rutgers University Dissertation Committee of my doctorate program.

There is no compensation or direct benefit for participating in this study, nor is there any known risk.

The data collected will provide useful information on exploring the association of organizational context with team functioning and team outcomes (namely, patient satisfaction). Your participation would greatly be appreciated! If you have any questions or concerns, please contact me at your earliest convenience.

Thank you,

Tracey

Tracey Vause Earland, MS, OTR/L
Assistant Professor, Department of Occupational Therapy
College of Health Professions, Thomas Jefferson University
215-503-4831
Tracey.vause-earland@jefferson.edu