2017

Patient Safety in the Ambulatory Oncology Environment: A TeamSTEPPS® Journey

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Patient Safety in the Ambulatory Oncology Environment: A TeamSTEPPS® Journey

by

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A DNP project submitted to the faculty of
Gardner-Webb University Hunt School of Nursing
in partial fulfillment of the requirements for the degree of
Doctorate of Nursing Practice

Boiling Springs, NC

2017

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Abstract

Patient safety is a focus for healthcare organizations across the country. The ambulatory oncology clinics in this organization are fast-paced environments, administering high-risk medications, performing high-risk procedures, and experiencing rapid growth. Improving the safety culture and reducing patient safety events are strategic goals for the organization. Teamwork and communication are essential components of effective teams, which influence the safety culture and patient safety in an organization. Interprofessional team training is a suggested intervention from the evidence to improve safety climate and culture (Salas et al., 2008). This paper highlights the implementation of an interprofessional TeamSTEPPS® education program in the ambulatory oncology environment to enhance teamwork, communication, and the safety culture, all of which impact patient safety.

Keywords: patient safety, TeamSTEPPS®, teamwork, communication, ambulatory oncology, interprofessional, team training

Acknowledgements

There are so many people I owe thanks to in regards to this journey. First, I thank God for the strength, determination, and courage to take on and complete this challenge. My husband Chris, who supported this adventure in so many ways, from his encouraging words to his thoughtful help with our daughter and daily duties despite his need to complete schoolwork for his Master's degree. To my daughter Lily who is the most helpful and supportive five year old, who was always willing to play school when I needed to focus on my assignments. I am so grateful for your love and support. To our families who support our journey in so many ways I cannot list, thank you.

I would also like to thank the organization for supporting my journey. To Priscilla Ramseur who supported my project, served as a committee member, provided financial support for the project, and inspired me to keep pushing despite competing priorities. To Pam Edwards, my mentor, who supported and encouraged me during my initial thoughts of going back to school and every day since. To Judy Prewitt, my forever cheerleader, who took time out of her hectic schedule to serve as a committee member, provide IRB guidance, and just check in on how things were going. To Bryan Sexton who offered guidance and facilitated a relationship with Safe and Reliable Healthcare for the use of the SCORE instrument for this project. Thank you to Claudia Paren for all the data provided. To Hutch Allen and Julie Thompson for sharing their amazing statistics and SPSS skills so willingly when I needed it the most. To the Cancer Center Leadership team, Jennifer Loftis, Sara Syvinski, Ramona Basnight, Tim Kelly, Sherri Dyke, Paige Cummings, and Michael Spiritos, who support this project and did everything they could

to make it successful. To the staff of the Cancer Center, who came to the offerings, were open and honest, made it fun, and their commitment to completing the surveys.

Dr. Cindy Miller who served as my chair, offering support and guidance every step of the way. To all wonderful faculty and staff in the Hunt School of Nursing at Gardner-Webb University, for making us feel welcomed when on campus and the continued support throughout the program. Finally, I would like to thank the wonderful members of this cohort, for the support, encouragement, comradery, and friendship. Each member truly cared about each other's success and was willing to offer assistance and share information with the group. It has truly been a blessing and an honour to be part of this group and to be on this journey with you.

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SECTION I

Problem Background and Significance

According to the Institute of Medicine (1999), 44,000-98,000 people die as a result of errors made in the healthcare system. System level failures and human error are often identified as causes of harm (Institute of Medicine, 1999). The Joint Commission (2016) reports ineffective communication as one of the top three causes of preventable death or injury for patients in the healthcare system from 2013-2015. The updated estimate of preventable patient harm now suggests up to 440,000 people die annually from medical errors (James, 2013). These staggering statistics have caused healthcare organizations across the country to focus on patient safety (Ulrich & Kear, 2014). Many organizations strive to develop and sustain a culture of safety; however, according to Katz-Navon, Naveh, and Stern (2005), the healthcare industry struggles with minimizing or eliminating errors impacting the patients they serve. The setting for this project continues to focus on ways to enhance patient safety and the safety culture.

Problem Statement

Safety culture is a distinct dimension of organizational culture with direct links to patient outcomes (Hudson, Berenholtz, Thomas, & Sexton, 2009). The Safety Attitudes Questionnaire (SAQ) was used to measure the safety climate in the organization and in individual departments in 2014. The goal zone of the SAQ is the 80th percentile, indicating need for improvement for scores falling below this threshold. At the organization, 17 departments out of 23 performed lower than the 80th percentile on the teamwork climate dimension on the SAQ administered in 2014. Nineteen departments scored below the goal zone in the safety climate dimension and 17 scored below the goal

in the stress recognition dimension.

The radiation oncology clinics scored in the 45th percentile and the hematology oncology clinics scored in the 55th percentile in the teamwork climate domain. Both areas scored in the risk zone for this domain reflecting the need for intervention to enhance team performance. In the safety climate domain the radiation oncology clinics scored in the 67th percentile and the hematology oncology clinics scored in the 76th percentile.

In 2016, the organization transitioned to the Safety, Communication, Operational Reliability, and Engagement (SCORE) survey replacing the previously used SAQ survey. The SCORE Survey measures the domains that make up the safety culture in an organization and in individual departments. The domains the SCORE instrument measures are learning environment, psychological safety, local leadership, burnout climate, personal burnout, teamwork climate, safety climate, and work life balance. This survey instrument has been modified from the previous SAQ; however, the teamwork and safety climate domains remain intact.

The teamwork climate of the SCORE is measured using 10 items that reflect the perceived quality of collaboration or teamwork between individuals (Sexton et al., 2006). In the teamwork climate, three of the six units in the oncology division scored below goal zone of the 60th percentile as seen in Figure 1. Per position, three of the six scored below the goal zone of the 60th percentile as seen in Figure 2.

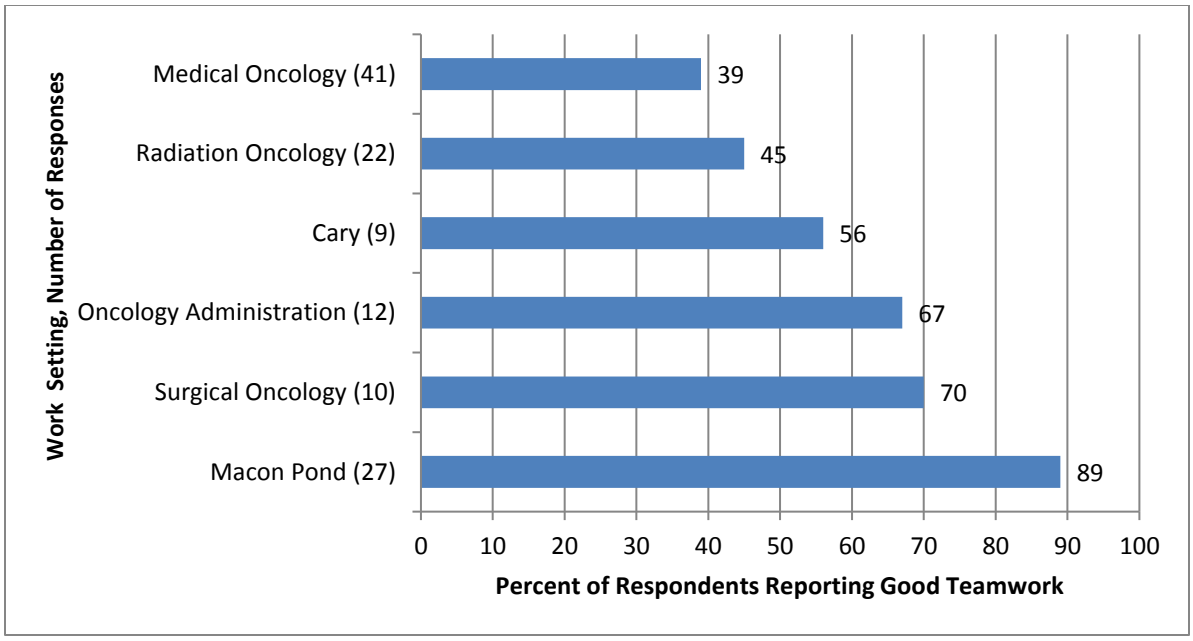

Figure 1. SCORE Teamwork Climate by Work Setting in the Ambulatory Oncology Department for 2016.

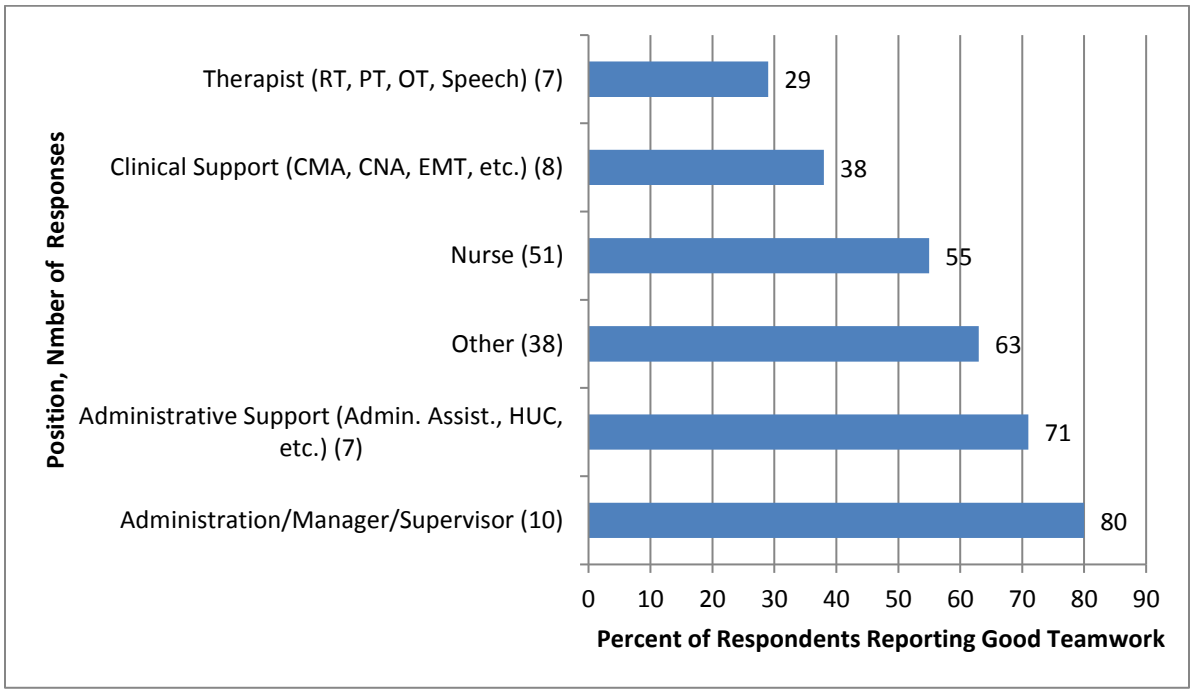

Figure 2. SCORE Teamwork Climate by Position in the Ambulatory Oncology Departments for 2016.

The safety climate measures the perception of commitment of the organization regarding safety (Sexton, et al., 2006). For the safety climate, three of the six units scored below the goal zone of the 60th percentile with one unit scoring at the goal zone as seen in Figure 3. Per position, three of the six scored below the goal zone of the 60th percentile as seen in Figure 4.

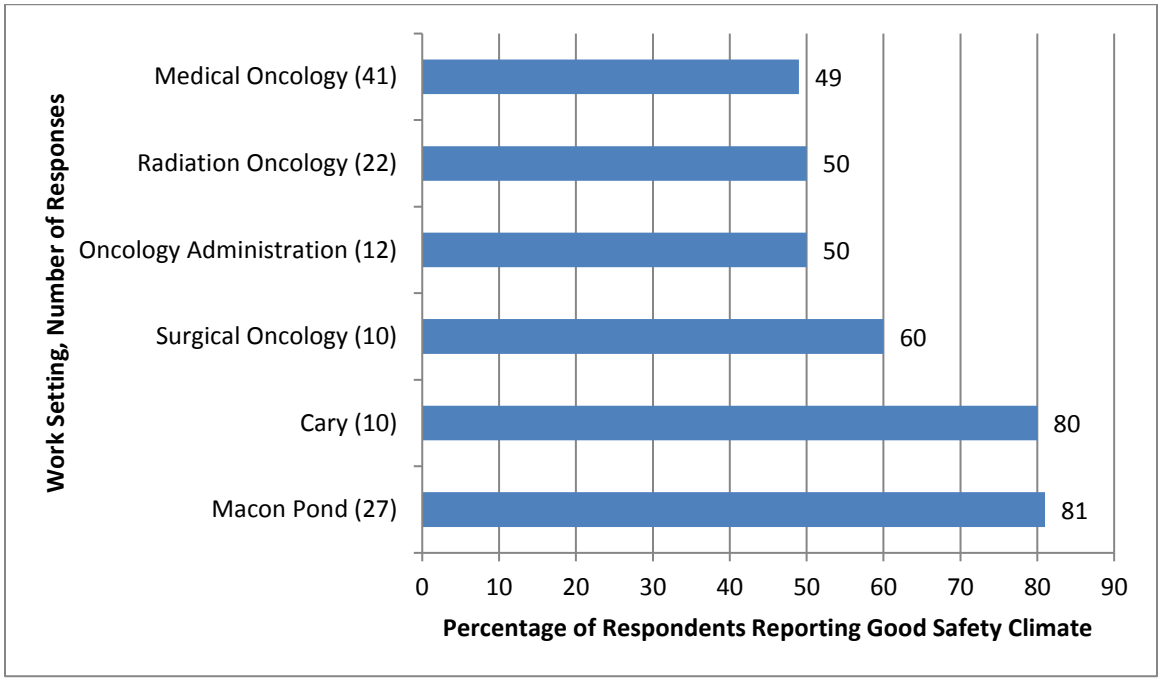

Figure 3. SCORE Safety Climate by Work Setting in the Ambulatory Oncology Departments for 2016.

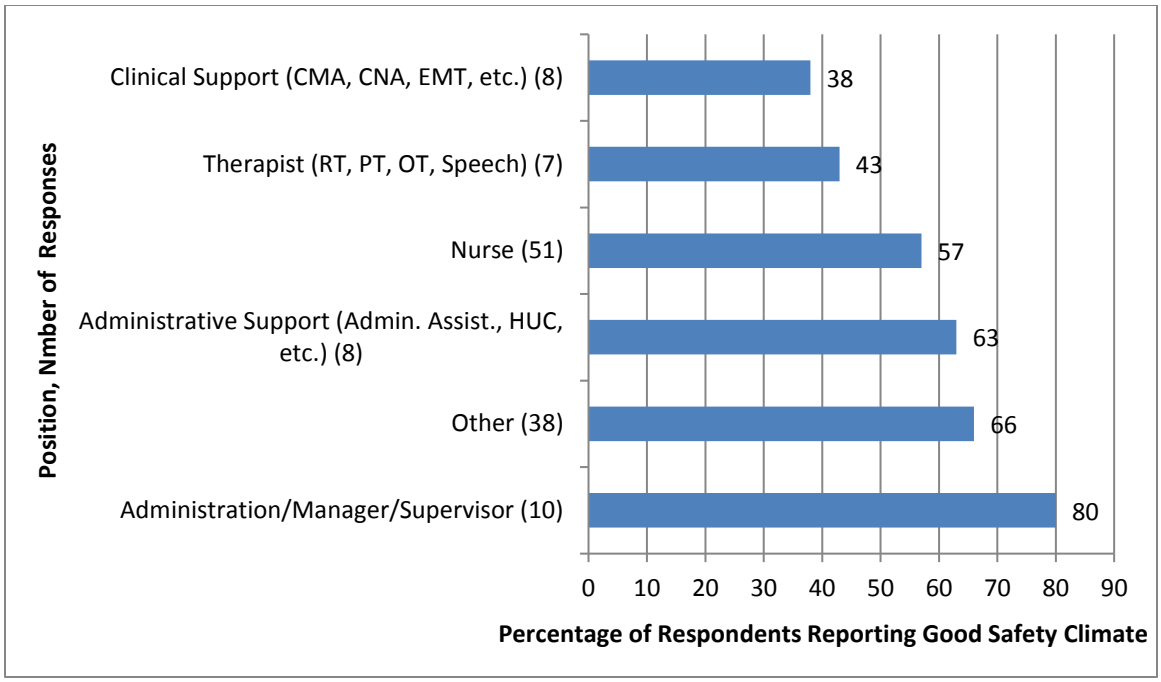

Figure 4. SCORE Safety Climate by Position in the Ambulatory Oncology Departments for 2016.

The learning environment domain assesses the perception of team members learning from each other, incidents, or errors in the environment. For the learning environment, three of the six units scored below the goal zone of the 60th percentile with one unit scoring at the goal zone as seen in Figure 5. Per position, three of the six scored below the goal zone of the 60th percentile as seen in Figure 6.

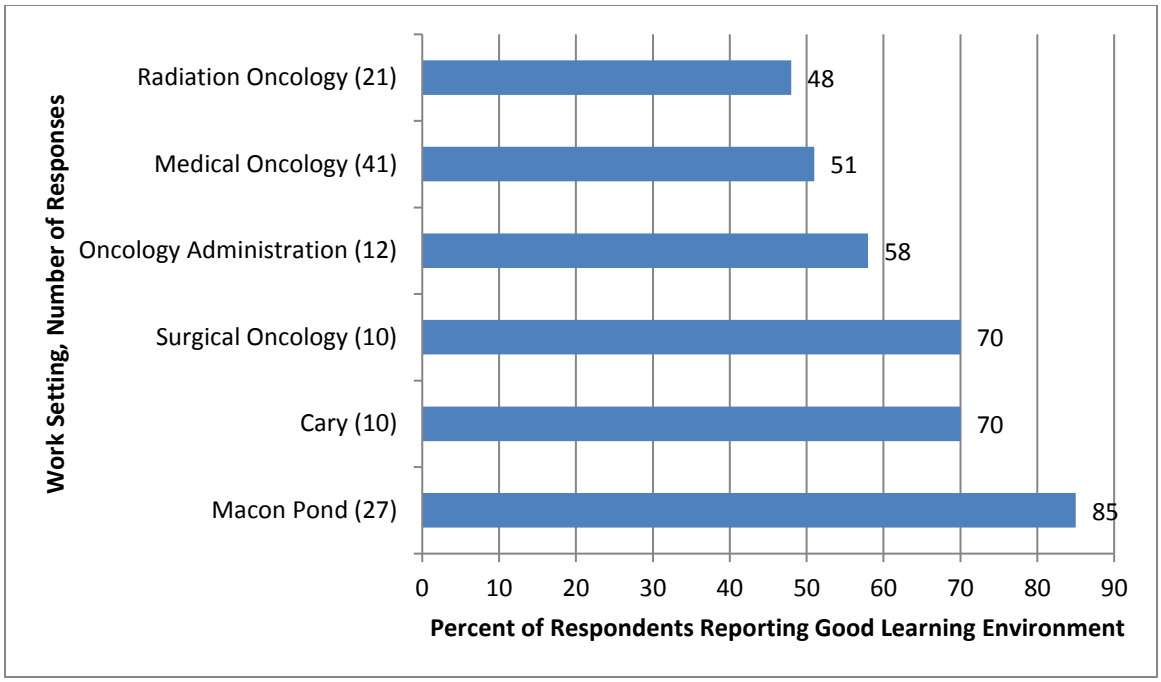

Figure 5. SCORE Learning Environment by Work Setting in the Ambulatory Oncology Departments for 2016.

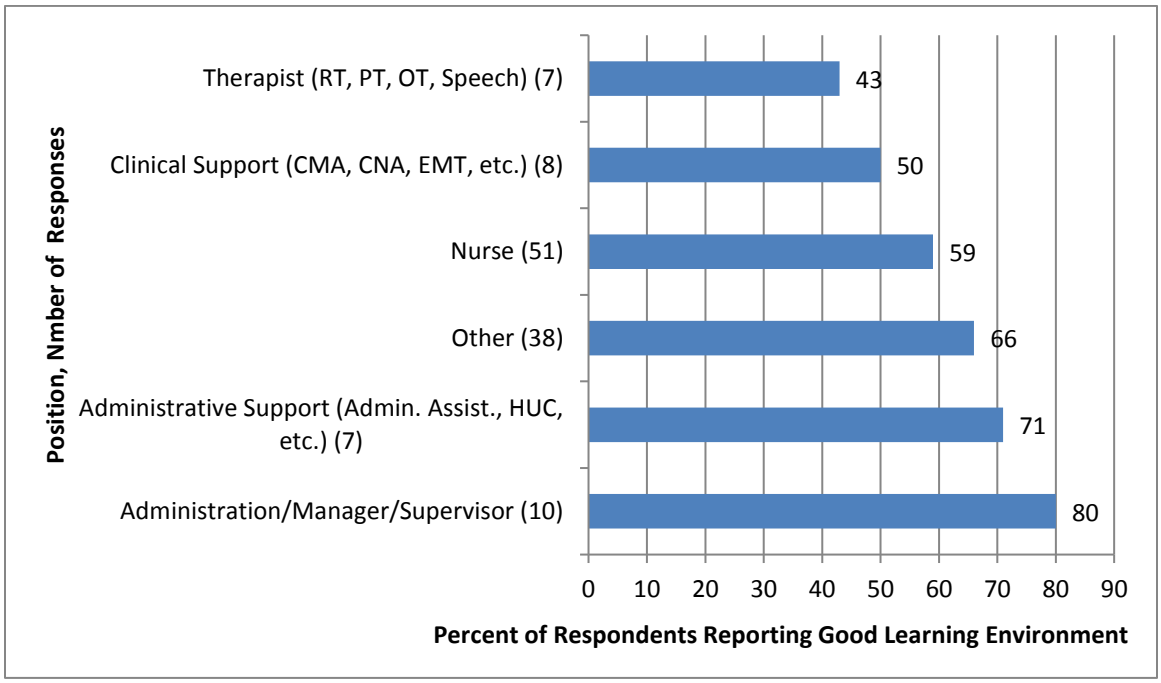

Figure 6. SCORE Learning Environment by Position in the Ambulatory Oncology Departments for 2016.

As an organization, leadership feels safety events are underreported. Near-misses are rarely reported through the system but are often brought forward when rounding with staff. Factors identified when rounding or via discussions with staff that influence not speaking up or reporting events include hierarchy in the clinical environments, fear of judgment from others, and fear of disciplinary action. Staff often refer to the safety event reporting system as punitive and do not see it as a learning or improvement mechanism. In the safety event reporting system, incidents related to professional conduct are tracked. Professional conduct reports are events or incidents that include unprofessional behavior such as intimidation, disruptive, threatening, violent, inappropriate, illegal, or in violation of the organizational policies. For fiscal year 2016, the organization had 127 events related to professional conduct with five events occurring in the ambulatory oncology clinics indicating hierarchy, a lack of teamwork, and ineffective communication.

A Root Cause Analysis (RCA) is a standardized approach including tools that are used to investigate the causes of errors or deviations in processes. RCAs are performed when a significant event or trend is identified through quality and safety screening. A Failure Mode Effects Analysis (FMEA) is performed to determine the severity score based on the Joint Commission's sentinel event categories. If the severity level is 12 or greater a RCA is performed. In fiscal year 2015, eight RCAs were performed on patient safety events and six were performed in fiscal year 2016. If the event is categorized as a non-sentinel event or scores 11 or less on the severity scale a learning from defects (LFD) is performed. A LFD is an approach utilizing tools and techniques to help the team learn how to fix or avoid future defects or errors. In fiscal year 2015, two LFDs were performed on safety events in the organization with seven performed in fiscal year 2016.

Ineffective communication was identified as a cause or contributing factor for all safety events analyzed during 2015-2016.

Improving the safety culture and reducing patient safety events are strategic goals for the organization. Ensuring patients are at the center of care and delivering the best possible quality outcomes while providing an excellent patient experience is the focus of the work across the organization. Analyzing the safety culture results, safety reporting events, RCAs, and LFD events confirms the organization has an obligation to improve the safety culture and enhance patient safety across the organization. Focusing on improving the safety culture and reducing patient safety events will also benefit the organization financially by reducing events impacting reimbursement.

Needs Assessment

Setting

An acute care facility associated with a larger health system was selected as the site for the project. The ambulatory oncology clinics that are part of the facility served as the implementation area. The clinics have multiple disciplines working together to care for the patients served. Physicians, advanced practice providers, nurses, radiation therapists, pharmacists, patient revenue employees, and patients were identified as the population impacted by this initiative.

Stakeholders

The project was supported by the Chief Executive Officer (CEO) with the Chief Nursing Officer (CNO) and Associate Chief Nursing Officer (ACNO) serving as the projects sponsors. The patient safety manager then the ACNO served as practicum partners. The oncology leadership team, consisting of the administrative director, clinical

operations director, nurse managers, clinical team leads, radiation therapist manager, Chief Medical Officer (CMO) an oncology provider, pharmacy manager, patient revenue manager, and supervisors were key stakeholders. Providers, staff members, and patients were also stakeholders in this project.

Team members

The clinical operations director, CMO, nurse managers, radiation therapist manager, patient revenue manager and staff identified as coaches made up the project team. The patient safety manager and the facility steering committee also guided project implementation.

Organizational Assessment

Strengths

The resources available to aid project implementation were key strengths. The organization has 21 master trainers with access to an international Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) training center in the health system. Classrooms were located onsite to host the training sessions. A secure survey platform, Qualtrics, was available to assist in data collection for the project. Executive leadership support from the CEO, CNO, CMO, and Chief Financial Officer (CFO) translating into accountability to all levels of the organization was an additional strength. Financial support for the implementation was approved to include time allocated for training of staff, instructor time, and cost of materials for training. Multiple master TeamSTEPPS® trainers had previous project implementation and training experience.

The ambulatory oncology team is committed to the values of the organization:

excellence, teamwork, safety, diversity, and integrity. The team is committed to keeping patients safe, quality improvement, and providing the best possible patient experience. All members of the team genuinely care for the patients served, are committed to improving the healthcare environment, and patient outcomes. Patients and families provide positive feedback on the care received at the oncology clinics, with many domains of the patient experience survey performing above the national benchmark. The project was aligned with the organization's mission, vision, and values. A commitment to zero harm spearheaded by the CEO provided further support for the project.

Weaknesses

The oncology clinics are experiencing a rapid growth in the volume of patients being treated. Many of the areas within the clinics were under construction due to the expansion of services. With the construction, some departments are physically segmented into areas that can break down teamwork and communication to other members of the team. One large radiation and hematology oncology clinic on campus and two off campus locations make up the oncology clinics. Teams were defined in some areas based on the provider in the practice or service provided which can break down communication and teamwork across the oncology service line. Distinct disciplines practice on the oncology team, all of which have been trained using different techniques to communicate and may not see the other disciplines' perspective. With the increase in volume at times, patients experience longer waits or delays.

Opportunities

The increase in patient volume provides an opportunity for improvement, expansion, and adjustments to workflow that can be positively influenced through a team approach. As demonstrated from the evidence reviewed, team training can impact more than just perception of teamwork, communication, and the safety climate. Team training has improved patient safety indicators, patient outcomes, and department or organizational efficiencies. The project has the potential to impact further areas of the oncology service line than previously identified.

Threats

Another organization within 15 miles also has an expanding oncology service. With patient experience scores and quality indicators being publically reported, the organization will need to sustain or improve in these areas to stay competitive. With the rapid growth in the oncology clinics, getting staff trained may be difficult with increased patient volume in these areas.

SECTION II

Literature Review

Databases and Key Words

The Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, EBSCO, and Full Text Plus were utilized to complete a robust search. The following keywords were used: team training, safety, patient safety, TeamSTEPPS®, safety climate, culture of safety, safety reporting, interprofessional, and ambulatory. Results included 1,300,000 articles for team training. When including safety as a search term, 459,000 articles resulted with the timeframe of 2007-2017. With the addition of patient safety, 112,000 articles resulted and 2,650 resulted with TeamSTEPPS® added to the search. The addition of safety climate narrowed the articles resulting to 675 and 632 articles resulted with the culture of safety added as a keyword. With the addition of safety reporting as a keyword 600 articles resulted with 384 resulting once interprofessional was added to the search. When health care was added, 384 articles resulted and when AND ambulatory was added, 171 articles resulted. When obstetrics was used as an exclusion keyword, 35 articles resulted. From this, 14 articles were reviewed based on the population identified in the article with four additional articles reviewed based on hallmark studies occurring before the designated timeframe. In addition, the Agency for Healthcare Research and Quality (AHRQ) website and materials were reviewed for content of the TeamSTEPPS® program and associated evidence provided.

Evidence

According to Gladstone (1995), multiple factors influence reporting or underreporting of errors including the nurse's fear of reaction from the manager, judgment from colleagues, not understanding what an error is, and fear of facing punishment. All of these factors have been identified by staff as reasons events are not reported in the organization. In a study by Blegen et al. (2004), nurses described that less than half of medication errors are reported due to fear of judgment. Underreporting of errors hinders the organization's ability to fix process issues which could result in further errors made, jeopardizing patient safety.

As stated by Leonard, Graham, and Bonacum (2016), ineffective communication is often a direct cause or contributing factor in safety events causing harm to patients. Enhancing teamwork and communication skills in interprofessional teams significantly impacts patient safety (Pfrimmer, 2009). According to Edmondson (1996) communication failures due to interdisciplinary tension prevent organizations from learning from mistakes. Rosenstein and O' Daniel (2008) found disruptive behaviors between physicians and nurses affect communication, collaboration, and can lead to preventable errors.

According to Rivard, Rosen, and Carroll (2006), organizational and group learning improves patient safety. In a meta-analysis by Salas et al., (2008) the literature suggests team training as an intervention to improve safety climate and culture. A systematic review by Weaver et al. (2013) establishes team training interventions improve interprofessional communication and organizational learning from errors.

TeamSTEPPS® is an evidence-based program designed to enhance communication and teamwork in the healthcare team (Agency for Healthcare Research and Quality, 2013). Developed by the Department of Defense with the Agency for Healthcare Research and Quality (AHRQ), TeamSTEPPS® focuses on four principles: communication, leadership, situation monitoring, and mutual support (Agency for Healthcare Research and Quality, 2014). Teachable learnable skills were developed as part of the program. The tools of two-challenge rule and I am Concerned, I am Uncomfortable, this is a Safety issue (CUS) are designed to create a common language to express safety concerns and facilitate a discussion for the team to have a shared mental model (Agency for Healthcare Research and Quality, 2014). The two-challenge rule is a tool that is utilized to raise a concern two times. This is used when the first attempt to discuss a concern is not heard, acknowledged, or resolved. The second time the concern is raised the two-challenge rule instructs to call the person by name to gain attention and or rephrase the concern. The CUS tool is an escalating tool that is used to address a concern three times using the words I am Concerned, I am Uncomfortable, this is a Safety issue while pausing in between to allow for perspective sharing and discussion. Briefs, huddles, and debriefs are tools utilized to enhance communication within the interprofessional team (Agency for Healthcare Research and Quality, 2014). Briefs occur at the beginning of the shift or before a procedure or event to discuss and develop a plan for the shift or procedure. Huddles are utilized to call the team together during the shift or procedure to discuss revisions to the plan or facilitate further communication. Debriefs are utilized after an event to assess what worked well and how the team or process could be improved next time. Situation background assessment recommendation

(SBAR) serves as a tool to communicate complete and vital information as well as make a request to another team member (Agency for Healthcare Research and Quality, 2014). Content on situational awareness and mutual support help team members learn techniques that encourage teamwork (Agency for Healthcare Research and Quality, 2014). With over 30 years of evidence, the TeamSTEPPS® program creates a common language for healthcare workers to communicate patient safety concerns. The goal of the program is to create a flat organizational structure in order for all members of the team to feel comfortable speaking up for safety and to enhance teamwork across the healthcare organization. The program strives to improve patient outcomes and enhance the safety culture.

Capella et al. (2010) explored how TeamSTEPPS® training and simulation impacted trauma team performance via observation post intervention. The interprofessional study demonstrated improvement in all four domains of the TeamSTEPPS® Team Performance Observation Tool (T-POT): leadership, situation monitoring, mutual support, and communication post simulation and training (Capella et al., 2010). Mayer et al. (2011) looked at how TeamSTEPPS® training not only positively impacted team work and communication but also impacted clinical outcomes. The study explored if team training using TeamSTEPPS® and the use of change team with leadership rounding in the clinical environment impacted timing of Extracorporeal Membrane Oxygenation (ECMO), length of rapid response events, and hospital acquired infections in the critical care environment (Mayer et al., 2011). Results indicated that clinical outcomes improved post training in all areas except length of rapid response events (Mayer et al., 2011). Thomas and Galla (2013) showed significant improvements

in the feedback and communication domains of the Hospital Survey on Patient Safety Culture (HSOPSC) post implementation of TeamSTEPPS® training with the use of coaches in the clinical environment to reinforce learning in the hospital system comprised of acute care facilities, long term care facilities, and outpatient areas. In a project by Jones, Skinner, High, and Reiter-Palmon (2013), three dimensions of the safety culture (organizational learning, teamwork in the department, and teamwork across departments) on the Hospital Survey on Patient Safety Culture (HSOPSC) improved in the intervention group completing TeamSTEPPS® team training utilizing coaches and leadership support as part of the implementation plan compared to the control groups.

Improved teamwork and communication attitudes among nursing staff resulted after the implementation of TeamSTEPPS® training in a Veterans Health Administration hospital (Vertino, 2014). The TeamSTEPPS® Teamwork Attitude Questionnaire (T-TAQ) was utilized to evaluate pre and post attitudes regarding teamwork. Coaching and continued support post implementation were also included as part of the intervention (Vertino, 2014). Harvey, Echols, Clark, and Lee (2014) compared two forms of team training utilizing TeamSTEPPS®. Simulation compared to case study review both resulted in improved communication and teamwork skills, with simulation having the greatest impact on the T-POT. In addition, Weld et al. (2015) found team training using TeamSTEPPS® decreased patient safety events and improved efficiency in the Operating Room. In a study by Lisbon et al. (2016) that focused on implementing TeamSTEPPS® utilizing coaching in the Emergency Department, post training communication significantly increased at both the 45 and 90 day evaluation period. A project by Gaston, Short, Ralyea, and Casterline (2016) resulted in improvement in the perceptions of

teamwork and communication after team training and coaching using the T-TPQ, HSOPSC, and focus groups to measure changes in the oncology service line. Outcomes from research, quality improvement projects, and evidence-based practice project implementations demonstrate TeamSTEPPS® training as a reliable method to improve teamwork, communication, impact the safety climate, and improve outcomes related to patient safety.

Limitations of Literature

Limited evidence is available focusing on the ambulatory care environments. Due to the gap in evidence, AHRQ put out a call for additional research in the ambulatory settings (Ricciardi, 2015). TeamSTEPPS® was originally implemented in hospitals, which has stemmed the call, and recent development of an ambulatory focused TeamSTEPPS® program to improve patient safety in this practice environment (Ricciardi, 2015).

Summary of Literature

Team training is an appropriate intervention for improving safety climate. The evidence reviewed helped increase awareness of types and methods for team training. Simulations, case study review, and didactic classes all had a positive relationship on teamwork, communication, the safety climate, or culture. Studies that utilized additional methods to translate knowledge gained in the intervention like observation post intervention, support from leadership like rounding, and coaching demonstrated impact on multiple dimensions of the safety climate or culture. These findings point to the need of multiple layers in the intervention that support knowledge transition in the clinical environment to truly change culture. Multiple tools were utilized to gather data in the

studies reviewed. Information gained from the review regarding tool functionality and results helped with tool selection for this project. The TeamSTEPPS® Teamwork Perception Questionnaire (T-TPQ) is the recommended instrument to assess change from pre to post intervention (Agency for Healthcare Research and Quality, 2013). Timeframe varied in the studies reviewed, which raises awareness of timeframe needed to see if the intervention has an impact and is sustainable over time. Overall, the literature reviewed gave insight to the process of project planning, implementation, data collection, analysis, and how to report findings that make it easy for clinicians to understand and implement in practice.

Project Purpose, Question, and Desired Outcomes

This quality improvement project's purpose was to enhance awareness of organizational learning in regards to patient safety utilizing TeamSTEPPS® training and coaches to create a climate of psychological safety where every member of the team is expected to speak up and feels comfortable speaking up for patient safety. The literature suggests team training impacts the safety climate and enhances patient safety. The project question was: In the interprofessional ambulatory oncology team (P), how does team training (I) affect the culture of safety and patient safety events (O) six months after training (T)? A desired outcome would be an enhanced safety climate reflected via survey results with an improvement on identified questions related to safety, teamwork, and communication.

Scope of Project

The safety culture survey results, RCAs, and LFD events confirmed the organization has an obligation to improve the safety climate and enhance patient safety (see Appendix A for Scope of Project). The CNO and ACNO served as project sponsors. The ambulatory oncology leadership team and identified staff coaches were team members.

Goal

The goal of this project was to enhance communication and teamwork in the interprofessional ambulatory oncology team resulting in an improved safety climate and a reduction in patient safety events.

Objective

Objective 1: Develop an implementation and sustainment plan, including education sessions with the interprofessional ambulatory oncology team to describe how the TeamSTEPPS® framework will enhance teamwork and communication.

Objective 2: Participants from the interprofessional ambulatory oncology team will identify the four teachable learnable skills: communication, leadership, situation monitoring, and mutual support. Using the SCORE safety survey, the safety culture score will improve by 10% post intervention on identified questions related to safety and teamwork. Regarding the T-TPQ, a 20% improvement on the scores post intervention is the goal. A 10% reduction of patient safety events requiring a RCA due to severity level of harm is the goal.

Objective 3: During the education session 90% of the interprofessional ambulatory oncology team participating will demonstrate the effective use of situation background assessment recommendation (SBAR) and I am Concerned, I am Uncomfortable, This is a Safety issue (CUS).

Mission Statement

This project was intended to enhance teamwork and communication in the interprofessional ambulatory oncology team. It was hoped that through TeamSTEPPS® training, participants would learn a common language to communicate patient safety concerns, how to create a shared mental model among team members regardless of education or title, and tools to enhance patient safety through teamwork. These strategies will help the organization meet strategic priorities, operational goals, and solidify the commitment to the patients served.

SECTION III

Theoretical Framework

The Relationship-Based Care model (Koloroutis et al., 2004) is the theoretical framework that guided this project. Leadership, teamwork, professional nursing practice, patient care delivery systems, resources, and outcomes measurement make up the six components of the model (Butts & Rich, 2015). The healthcare provider's relationship with patients, families, self, and with colleagues serve as the crucial elements (Butts & Rich, 2015). There are 12 basic value assumptions in the model. Of the 12, the following values link to the project: all members of the team make a valuable contribution; healthy interprofessional relationships lead to the delivery of quality patient care; the patient experience is improved when individuals own their practice and are valued for their contribution; people are open to change when there is a common vision; education is provided and evidence is shared showing the impact of change; change happens one relationship at a time (Butts & Rich, 2015). The six components and applicable values of the model align with the TeamSTEPPS® model that focuses on enhancing team performance and patient safety with the principles of leadership, communication, situation monitoring, and mutual support. Transformation occurs when inspiration, infrastructure, education, and evidence are established (Butts & Rich, 2015). The education sessions were designed to teach participants how to use the TeamSTEPPS® tools to enhance team performance and clinical outcomes. Information about why this initiative is important for the organization, the evidence that supports the TeamSTEPPS® tools as an intervention and patient stories to inspire participants were also included in the classes. Three types of thinking: critical thinking, creative thinking,

and reflective thinking are part of the model. The education session activities and coaches for the project helped facilitate the three thinking modes when implementing the tools from TeamSTEPPS® into the work environment. Utilizing the TeamSTEPPS® tools of briefs, huddles, debriefs, SBAR, and CUS facilitated staff utilizing the three types of thinking in the Relationship-Based Care model. (Figure 7)

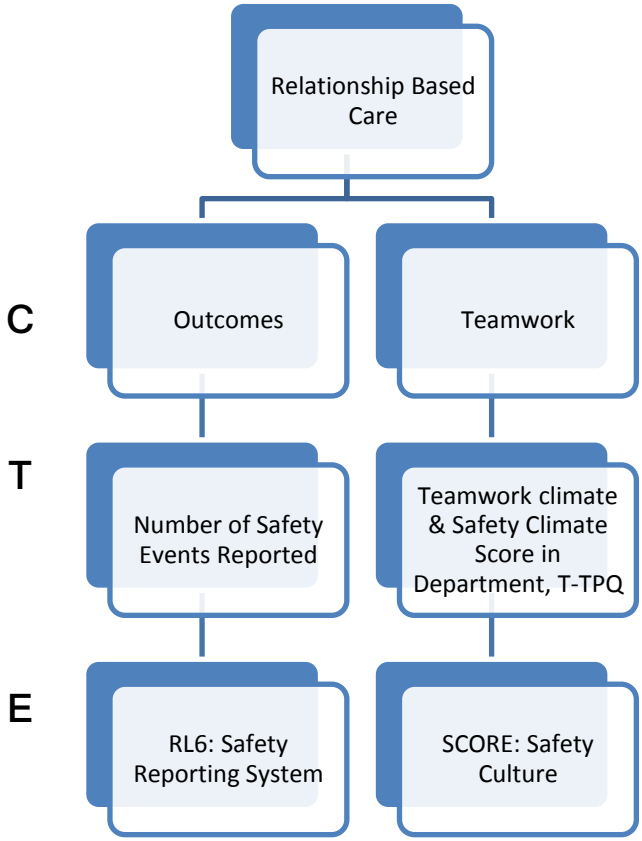

Figure 7. Relationship Based Care Model

SECTION IV

Project Design

Setting

The interprofessional TeamSTEPPS® training was conducted at the ambulatory oncology clinics. Offerings for each session were conducted at all three clinic locations during times that facilitated ease of attendance for participants. Classroom space, equipment, and materials were secured to facilitate successful sessions.

Project Participants

A convenience sample of the interprofessional team members serving the oncology population included: nurses, physicians, advanced practice providers, radiation therapists, pharmacists, and patient revenue employees. Participation was voluntary, although highly encouraged, and in some cases scheduled by the leadership team.

Project Plan and Timeline

The SCORE safety survey was administered in May 2016 across the organization. Education sessions for the project started in June 2016. The T-TPQ was administered at the start of education session one via Qualtrics or paper. A teamwork activity was utilized as an icebreaker to start each education session. The content of the four teachable learnable skills of communication, leadership, situation awareness, and mutual support were broken out over three sessions. The first education session gave an overview of TeamSTEPPS®, the evidence to support it, and gave the participants the first two tools: the two-challenge rule and CUS. Participants were given the oncology-based CUS scenarios developed by the project team to demonstrate use of the tools to end the session. The case studies were used to role play tool use to address the oncology specific

scenario with participants sharing with the class the process and resolution. Participants shared ideas of scenarios and opportunities to use the tools in the clinical environment for future use.

Two weeks after the first session, the Pulse SCORE was administered at the start of education session two via Qualtrics or paper. The content for the second education session included a review of the tools from session one and asked participants to share use of the tools in the clinical environment. Participants were taught the tools of briefs, huddles, and debriefs. Each group was given a case study to demonstrate application of the tools learned in the session.

Two weeks later the second Pulse SCORE was administered at the start of education session three via Qualtrics or on paper. Review of the tools and sharing stories of briefs, huddles, and debriefs in the clinical environment opened session three. The content for session three focused on the SBAR tool with participants demonstrating application of the tool via case studies. Review of all the content, tools, and a discussion on opportunities to use the tools in the clinical environment wrapped up session three. The T-TPQ was administered at end of education session three via Qualtrics or paper. Two weeks later the Pulse SCORE survey was administered via a link to Qualtrics or via paper when rounding in the clinics.

Makeup education sessions were conducted during the month of August and September 2016 and were identical to the process for the previous sessions. The SCORE safety survey was administered at three months and six months post the last education session via a link to Qualtrics or on paper when rounding in the clinics. Patient safety

events were tracked six months post intervention (see Appendix B for timeline and GANNT chart).

Outcomes Measurements

Multiple instruments were utilized to collect data for this project. To measure teamwork perception the TeamSTEPPS® Teamwork Perceptions Questionnaire (T-TPQ) was administered via Qualtrics or on paper (see Appendix C for T-TPQ). The T-TPQ is available for use for free on the AHRQ website, a public domain. The T-TPQ instrument consists of 35 questions broken down into five sections: team structure, leadership, situation monitoring, mutual support, and communication (Battles & King, 2010). The tool used a Likert-Scale for responses with choices of strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). The instrument reliability via Cronbach's $\alpha = 0.978$.

To measure safety culture the Safety, Communication, Operational Reliability, and Engagement (SCORE) instrument and the Pulse SCORE (abbreviated version) instrument administered by Safe & Reliable Healthcare were utilized. Both instruments utilize a Likert-Scale for responses of disagree strongly (1), disagree slightly (2), neutral (3), agree slightly (4), agree strongly (5), and not applicable (0). The Pulse SCORE consists of 10 questions from the teamwork climate domain of the full SCORE instrument. Additional data collected included participant position, training completed related to this project, and two open ended questions (what TeamSTEPPS® tools, if any, are you seeing used and how is it going and any other comments). The Cronbach's alpha for the teamwork climate is .821 (Sexton, 2015).

The full SCORE instrument consists of work setting, position, years in specialty, shift worked, shift length, gender, primary population served, and six domains. The domains are learning environment consisting of seven questions, local management consisting of seven questions, six questions in the burnout climate, personal burnout with six questions, teamwork climate consisting of 10 questions, and nine questions in the safety climate domain. The SCORE instrument Cronbach's alpha ranges from .820-.964 for statistical data for each domain (Sexton, 2015).

Safety events were tracked pre and post intervention by the number of RCAs and LFDs performed by severity level. No patient identification data was reviewed or tracked during data collection.

Cost/Benefit Analysis

According to Van Den Bos et al. (2011) the average cost of a medical error is $11,366. Last year the organization performed 13 RCAs and LFDs that were triggered by medical errors, costing the organization approximately $147,758 based on the average cost. The actual cost of a medical error can be higher or lower based on what type of error occurs. Finances needed to provide the training including salary and material costs were $9,722.92. If the organization reduces one medical error as a result of training, the organization will save approximately $1,643.08 (see Appendix D for cost/benefit analysis). If the organization reduces medical errors by five, the organization will save approximately $47,107.08. The organization is committed to doing the right thing for the patients served, regardless of the cost of training.

Ethical Considerations

Institutional Review Board (IRB) permission was obtained at the organization and the University. This quality improvement project met the criteria of exempt as no anticipated harm for participants was identified (see Appendix E for project plan). No patient or protected health information was collected for this project. Qualtrics was utilized to complete the T-TPQ with a paper version available for those who could not complete electronically. Paper survey responses were entered into the Qualtrics platform. Only the PI and project chair had access to the survey results. Identifying information of participants was not collected as part of this survey. Results were stored electronically with paper copies secured in a locked file cabinet.

The SCORE and Pulse SCORE were administered by Safe & Reliable Healthcare. A paper version was available for those who could not complete electronically. Paper survey responses were entered into the Safe & Reliable Healthcare survey platform. No participant identification or employee numbers were collected. Results were stored electronically with paper copies in a locked file cabinet.

Verbal consent was obtained by participants prior to the start of each session. In addition, printed versions of the consent were handed out at each session. An electronic version of the consent was attached to each email sent to participants encouraging survey completion. Survey completion was voluntary and participants were allowed to complete the session regardless of survey completion.

SECTION V

Project Implementation

Coaches were identified in the areas to provide in the moment coaching and positive reinforcement of the TeamSTEPPS® tools. The coaches identified by department leadership received TeamSTEPPS® Essential training to prepare for the coaching role. Bi-weekly then weekly meetings were held with the leadership team and coaches to provide support, training for the coach role, and to discuss the project implementation plan. The coaches helped develop the case studies and scenarios for the tool practice in the educations sessions with some coaches presenting a topic in the education session or leading the case studies. This facilitated real life scenarios the team faced to facilitate application of content learned. Coaches were utilized to observe briefs, huddles, debriefs, and be in the clinical areas to serve as a resource for TeamSTEPPS® implementation throughout the project. Coaches provided positive reinforcement to staff when using the TeamSTEPPS® tools and offered suggestions on when to use a TeamSTEPPS® tool to team members. Coaches were provided support throughout project implementation when rounding in the department, via email, or phone call. Positive stories were shared of tool application in the clinical environment as well as discussion on opportunities for further tool use. Feedback on what was working well in the clinical environment and what could use reinforcement continues to be discussed with the coaches.

The SCORE safety survey was conducted by the organization in May 2016 and was used as pre data for the project. Nine education sessions were planned per topic due to scheduling and the number of people working for the ambulatory oncology service

line. However, due to staffing issues and competing priorities 10 sessions were given per topic with an additional two per session in the makeup offerings except for session three which had three offerings for a total of 37 offerings. The T-TPQ was administered via Qualtrics or paper at start of education session one. The content for education session covered: what are TeamSTEPPS® and CUS.

Two weeks later the Pulse SCORE was administered by Safe & Reliable Healthcare (the organization that currently administers the SCORE survey organization wide) via a link to participants' email or via paper at the start of education session two. The content for education session two covered: review of tools, sharing of tool use, briefs, huddles, and debriefs. Two weeks later the Pulse SCORE was administered by Safe & Reliable Healthcare via a link to participants' email or via paper at the start of education session three. The content for education three covered: review of tools, sharing stories of tool use, SBAR, and a review of all content. The T-TPQ survey was administered to collect post implementation data at the end of session three. Two weeks later the Pulse SCORE was administered by Safe & Reliable Healthcare via a link to participants' email or via paper when rounding in the departments to encourage participation. The SCORE safety survey was administered by Safe & Reliable Healthcare via a link to participants' email or via paper when rounding in the departments to encourage completion at three months and six months post education session three.

Evaluation Plan

Preliminary, group comparison, and repeat measure analysis with appropriate follow-up analyses were used to evaluate project outcomes. Preliminary included standard tests of normality, descriptive statistics and correlations across all composites

within each outcome measure. Group comparison analyses tests were performed depending on tests of normality. Repeat measure analyses depending on tests of normality were performed.

SECTION VI

Project Evaluation

Facilitators

Support and buy-in for this project facilitated a positive implementation experience. The commitment of the staff members who are dedicated to living the mission, vision, and values of the organization by attending the session and completing surveys regardless of competing priorities was another positive facilitator. Leadership and financial support were essential to the success of the project. The coaches reinforced learning in the clinical environment after the education intervention was attended to enculturate the tools into practice. Overall support from the organization to conduct the project despite a more aggressive timeline facilitated optimal timing for implementation in the oncology environment.

Barriers

Several barriers had to be addressed during project implementation. Competing priorities due to staffing and expanding services were identified that impacted attendance. Patient care always comes first in the organization; therefore, additional sessions were added to facilitate attendance. One challenge was related to the project design of breaking the education up into three sessions. This made it more difficult for staff to complete the program in its entirety due to the competing priorities, staffing, and increased patient volume.

Patient Safety events were tracked pre and post implementation utilizing the organization's safety reporting system. Events that triggered an RCA or LFD due to severity level were obtained from the patient safety office.

The IBM® Statistical Package for the Social Sciences®, Version 24, was utilized to analyze the data for the T-TPQ and Pulse SCORE instruments. Preliminary analysis of the data included tests of normality, descriptive statistics, and correlations across all composites within each outcome measure for the T-TPQ and Pulse SCORE instruments. Shapiro Wilk test results indicated that several items on the T-TPQ and Pulse SCORE had $p = .05$ or less, therefore the data was not normally distributed. Mann-Whitney U tests were run to analyze the data from the T-TPQ and Pulse SCORE.

Preliminary analysis of the data included tests of normality, descriptive statistics, and correlations for the SCORE survey. Shapiro Wilk test results indicated that several items on the SCORE had $p = .05$ or less, therefore the data was not normally distributed. A Mann-Whitney U test was run to analyze the data from the SCORE.

SECTION VII

Results

A total of 138 participants completed session one of the training out of the 155 team members in the ambulatory oncology clinics for a rate of 89%. Session two had 132 participants complete of the 155 for a rate of 85%. One hundred and eighteen participants completed session three (76%) with a total of 111 participants completing all three session (72%) of the 155 team members. The leadership team and coaches continued to communicate the tools and how the tools would be operationalized during briefs, huddles, and staff meetings for those who did not complete the sessions.

RCAs are performed when a significant event or trend is identified through the quality and safety screening process. A Failure Mode Effects Analysis (FMEA) is performed to determine the severity score based on the Joint Commission's sentinel event categories. If the severity level is 12 or greater, a RCA is performed. If the event is categorized as a non-sentinel event or scores 11 or less on the severity scale, a learning from defects (LFD) is performed. Patient safety events were reviewed for fiscal year 2017 to date, zero RCAs have been conducted. Two LFD were triggered based on severity level with two more in progress, for a total of four as seen in Figure 8. Ineffective communication was identified as a contributing factor for the four safety events analyzed.

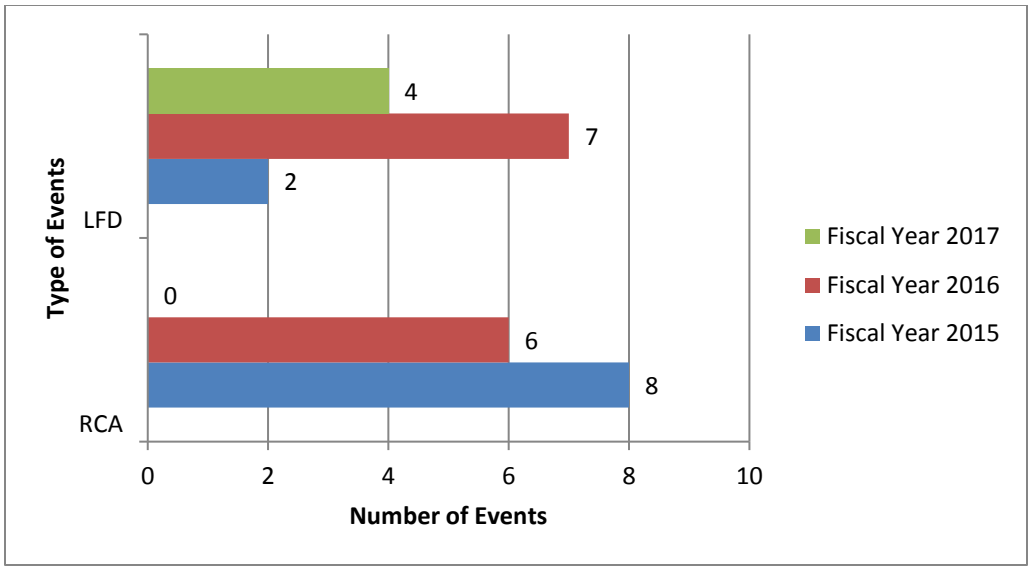

Figure 8. Number of Patient Safety Events by Type for Fiscal Year 2015-2017 to Date.

In the safety event reporting system incidents related to professional conduct are tracked. For fiscal year 2015, the organization had 83 events related to professional conduct with three events occurring in the ambulatory oncology. For fiscal year 2016, 127 professional conduct events were reported with five occurring in the ambulatory oncology clinics. For fiscal year 2017 to date, 81 events related to professional conduct were reported, with two events occurring in the ambulatory oncology clinics post intervention. This showed a reduction in unprofessional events occurring post training.

T-TPQ Traditional Group

One hundred and forty participants completed the T-TPQ pre intervention for a response rate of 101%, as two people started the first session but ended up leaving due to a patient need and did not complete the session. Ninety-three participants of the 109 completed the post T-TPQ survey in the traditional group for a response rate of 85%. T-TPQ items were compared pre and post intervention, as well as domain scores and the

overall scores. Results for the individual item and domain comparisons are displayed in Table 1 and show that there were 20 items that had a significant increase from pre to post for the traditional group (see Table 1). As well, all five of the domain scores had significant increases from pre to post in the traditional group (see Table 1). The overall score was statistically significant from pre to post in the traditional group at $p < .001$.

Table 1

T-TPQ Traditional Group Statistical Results. *Significance (Sig) equals the p-value.*

Item/Domain	Pre Median	Post Median	Sig.
Team Structure			
The skills of staff overlap sufficiently so that work can be shared when necessary.	4.00	4.00	0.26
Staff are held accountable for their actions.	4.00	4.00	0.02
Staff within my unit share information that enables timely decision making by the direct patient care team.	4.00	4.00	0.06
My unit makes efficient use of resources (e.g., staff, supplies, equipment, information).	4.00	4.00	0.05
Staff understand their roles and responsibilities.	4.00	4.00	0.29
My unit has clearly articulated goals.	4.00	4.00	0.14
My unit operated at a high level of efficiency.	4.00	4.00	0.14
Team Structure Overall	3.71	4.00	0.02
Leadership			
My supervisor/manager considers staff input when making decisions about patient care.	4.00	4.00	0.04
My supervisor/manager provides opportunities to discuss the unit's performance after an event.	3.00	4.00	0.00
My supervisor/manager takes time to meet with staff to develop a plan for patient care.	3.00	4.00	0.06
My supervisor/manager ensures that adequate resources	4.00	4.00	0.39

Item/Domain	Pre Median	Post Median	Sig.
(e.g., staff, supplies, equipment, information) are available.			
My supervisor/manager resolves conflicts successfully.	3.00	4.00	0.07
My supervisor/manager models appropriate team behavior.	4.00	4.00	0.02
My supervisor/manager ensures that staff are aware of any situations or changes that may affect patient care.	4.00	4.00	0.02
Leadership Overall	3.43	3.71	0.01
Situation Monitoring			
Staff effectively anticipate each other's needs.	4.00	4.00	0.01
Staff monitor each other's performance.	3.00	4.00	0.00
Staff exchange relevant information as it becomes available.	4.00	4.00	0.02
Staff continuously scan the environment for important information.	4.00	4.00	0.00
Staff share information regarding potential complications (e.g., patient changes, bed availability).	4.00	4.00	0.00
Staff meets to reevaluate patient care goals when aspects of the situation have changed.	4.00	4.00	0.00
Staff correct each other's mistakes to ensure that procedures are followed properly.	4.00	4.00	0.40
Situation Monitoring Overall	3.51	3.86	0.00
Mutual Support			
Staff assist fellow staff during high workload.	4.00	4.00	0.72
Staff request assistance from fellow staff when they feel overwhelmed.	4.00	4.00	0.01
Staff caution each other about potentially dangerous situations.	4.00	4.00	0.04
Feedback between staff is delivered in a way that promotes	3.00	4.00	0.00

Item/Domain	Pre Median	Post Median	Sig.
positive interactions and future changes.			
Staff advocate for patients even when their opinion conflicts with that of a senior member of the unit.	4.00	4.00	0.02
When staff have a concern about patient safety, they challenge others until they are sure the concern has been heard.	4.00	4.00	0.15
Staff resolve their conflicts, even when the conflicts have become personal.	3.00	4.00	0.00
Mutual Support Overall	3.57	4.00	0.00
Communication			
Information regarding patient care is explained to patients and their families in lay terms.	4.00	4.00	0.05
Staff relay relevant information in a timely manner.	4.00	4.00	0.00
When communicating with patients, staff allow enough time for questions.	4.00	4.00	0.53
Staff use common terminology when communicating with each other.	4.00	4.00	0.04
Staff verbally verify information that they receive from one another.	4.00	4.00	0.01
Staff follow a standardized method for sharing information when handing off patients.	4.00	4.00	0.00
Staff seek information from all available sources.	4.00	4.00	0.08
Communication Overall	3.86	4.00	0.01
T-TPQ Overall	3.50	3.85	0.00

T-TPQ Makeup Group

All 22 participants completed the pre-intervention T-TPQ survey for a response rate of 100%. All 12 completed the post survey for the makeup group for a response rate of 100%. T-TPQ items were compared pre and post intervention, as well as domain scores and the overall scores. Results for the individual items and domain comparisons in the makeup group are displayed in Table 2 and show that there were eight items that had a significant increase from pre to post for the traditional group (see Table 2). As well, two of the five domain scores had significant increases from pre to post in the makeup group (see Table 2). The overall score was not statistically significant from pre to post in the makeup group at $p = .46$.

Table 2

T-TPQ Makeup Group Statistical Results. Significance (Sig) equals the p-value.

Item/Domain	Pre Median	Post Median	Sig.
Team Structure			
The skills of staff overlap sufficiently so that work can be shared when necessary.	4.00	4.00	0.34
Staff are held accountable for their actions.	4.00	4.00	0.23
Staff within my unit share information that enables timely decision making by the direct patient care team.	4.00	4.50	0.03
My unit makes efficient use of resources (e.g., staff, supplies, equipment, information).	4.00	4.00	0.73
Staff understand their roles and responsibilities.	4.00	4.50	0.20
My unit has clearly articulated goals.	4.00	4.00	0.32
My unit operated at a high level of efficiency.	4.00	4.00	0.34
Team Structure Overall	4.07	4.21	0.25

Item/Domain	Pre Median	Post Median	Sig.
	Leadership		
My supervisor/manager considers staff input when making decisions about patient care.	4.00	4.00	0.94
My supervisor/manager provides opportunities to discuss the unit's performance after an event.	4.00	4.00	0.53
My supervisor/manager takes time to meet with staff to develop a plan for patient care.	4.00	4.00	0.98
My supervisor/manager ensures that adequate resources (e.g., staff, supplies, equipment, information) are available.	4.00	4.00	0.72
My supervisor/manager resolves conflicts successfully.	4.00	4.00	0.69
My supervisor/manager models appropriate team behavior.	4.00	4.00	0.73
My supervisor/manager ensures that staff are aware of any situations or changes that may affect patient care.	4.00	4.00	0.55
Leadership Overall	3.93	4.00	0.78
	Situation Monitoring		
Staff effectively anticipate each other's needs.	4.00	4.00	0.04
Staff monitor each other's performance.	4.00	4.00	0.05
Staff exchange relevant information as it becomes available.	4.00	4.00	0.22
Staff continuously scan the environment for important information.	4.00	4.00	0.07
Staff share information regarding potential complications (e.g., patient changes, bed availability).	4.00	4.00	0.05
Staff meets to reevaluate patient care goals when aspects of the situation have changed.	4.00	5.00	0.02
Staff correct each other's mistakes to ensure that procedures are followed properly.	4.00	4.50	0.01

Item/Domain	Pre Median	Post Median	Sig.
Situation Monitoring Overall	3.86	4.07	0.03
Mutual Support			
Staff assist fellow staff during high workload.	4.00	5.00	0.27
Staff request assistance from fellow staff when they feel overwhelmed.	4.00	5.00	0.05
Staff caution each other about potentially dangerous situations.	4.00	5.00	0.02
Feedback between staff is delivered in a way that promotes positive interactions and future changes.	4.00	4.00	0.29
Staff advocate for patients even when their opinion conflicts with that of a senior member of the unit.	4.00	4.00	0.09
When staff have a concern about patient safety, they challenge others until they are sure the concern has been heard.	4.00	4.50	0.01
Staff resolve their conflicts, even when the conflicts have become personal.	4.00	4.50	0.33
Mutual Support Overall	4.00	4.56	0.08
Communication			
Information regarding patient care is explained to patients and their families in lay terms.	4.00	5.00	0.12
Staff relay relevant information in a timely manner.	4.00	5.00	0.02
When communicating with patients, staff allow enough time for questions.	4.00	5.00	0.05
Staff use common terminology when communicating with each other.	4.00	4.00	0.23
Staff verbally verify information that they receive from one another.	4.00	4.00	0.07

Item/Domain	Pre Median	Post Median	Sig.
Staff follow a standardized method for sharing information when handing off patients.	4.00	4.00	0.01
Staff seek information from all available sources.	4.00	4.00	0.07
Communication Overall	4.00	4.29	0.02
T-TPQ Overall	3.90	4.00	0.46

T-TPQ Combined Groups

T-TPQ items were compared pre and post intervention, as well as domain scores and the overall scores for both groups combined. Results for the individual items and domain comparisons are displayed in Table 3 and show that there were 21 items that had a significant increase from pre to post for the combined groups (see Table 3). As well, all five of the domain scores had significant increases from pre to post in the combined group (see Table 3). The overall score was statistically significant from pre to post in the combined groups at $p < .001$.

Table 3

T-TPQ Combined Groups Statistical Results. Significance (Sig) equals the p-value.

Item/Domain	Pre Median	Post Median	Sig.
Team Structure			
The skills of staff overlap sufficiently so that work can be shared when necessary.	4.00	4.00	0.18
Staff are held accountable for their actions.	4.00	4.00	0.01
Staff within my unit share information that enables timely decision making by the direct patient care team.	4.00	4.00	0.02
My unit makes efficient use of resources (e.g., staff,	4.00	4.00	0.06

Item/Domain	Pre Median	Post Median	Sig.
supplies, equipment, information).			
Staff understand their roles and responsibilities.	4.00	4.00	0.17
My unit has clearly articulated goals.	4.00	4.00	0.09
My unit operated at a high level of efficiency.	4.00	4.00	0.09
Team Structure Overall	3.86	4.00	0.01
Leadership			
My supervisor/manager considers staff input when making decisions about patient care.	4.00	4.00	0.06
My supervisor/manager provides opportunities to discuss the unit's performance after an event.	3.00	4.00	0.00
My supervisor/manager takes time to meet with staff to develop a plan for patient care.	3.00	4.00	0.10
My supervisor/manager ensures that adequate resources (e.g., staff, supplies, equipment, information) are available.	4.00	4.00	0.35
My supervisor/manager resolves conflicts successfully.	4.00	4.00	0.08
My supervisor/manager models appropriate team behavior.	4.00	4.00	0.06
My supervisor/manager ensures that staff are aware of any situations or changes that may affect patient care.	4.00	4.00	0.05
Leadership Overall	3.57	3.86	0.02
Situation Monitoring			
Staff effectively anticipate each other's needs.	4.00	4.00	0.00
Staff monitor each other's performance.	3.00	4.00	0.00
Staff exchange relevant information as it becomes available.	4.00	4.00	0.01
Staff continuously scan the environment for important information.	4.00	4.00	0.00
Staff share information regarding potential complications	4.00	4.00	0.00

Item/Domain	Pre Median	Post Median	Sig.
(e.g., patient changes, bed availability).			
Staff meets to reevaluate patient care goals when aspects of the situation have changed.	4.00	4.00	0.00
Staff correct each other's mistakes to ensure that procedures are followed properly.	4.00	4.00	0.11
Situation Monitoring Overall	3.57	3.86	0.00
Mutual Support			
Staff assist fellow staff during high workload.	4.00	4.00	0.59
Staff request assistance from fellow staff when they feel overwhelmed.	4.00	4.00	0.00
Staff caution each other about potentially dangerous situations.	4.00	4.00	0.00
Feedback between staff is delivered in a way that promotes positive interactions and future changes.	4.00	4.00	0.00
Staff advocate for patients even when their opinion conflicts with that of a senior member of the unit.	4.00	4.00	0.01
When staff have a concern about patient safety, they challenge others until they are sure the concern has been heard.	4.00	4.00	0.02
Staff resolve their conflicts, even when the conflicts have become personal.	3.00	4.00	0.00
Mutual Support Overall	3.57	4.00	0.00
Communication			
Information regarding patient care is explained to patients and their families in lay terms.	4.00	4.00	0.03
Staff relay relevant information in a timely manner.	4.00	4.00	0.00
When communicating with patients, staff allow enough	4.00	4.00	0.21

Item/Domain	Pre Median	Post Median	Sig.
time for questions.			
Staff use common terminology when communicating with each other.	4.00	4.00	0.02
Staff verbally verify information that they receive from one another.	4.00	4.00	0.00
Staff follow a standardized method for sharing information when handing off patients.	4.00	4.00	0.00
Staff seek information from all available sources.	4.00	4.00	0.03
Communication Overall	3.86	4.00	0.00
T-TPQ Overall	3.63	3.85	0.00

Pulse SCORE Traditional Group

One hundred and three participants of the 118 who attended the second session completed the first Pulse survey for a response rate of 87%. One hundred participants of the 109 who attended the third session completed the second survey for a response rate of 92%. Ninety-four participants of the 109 who completed the third session completed the third Pulse survey for a response rate of 86% for the traditional group.

The Pulse SCORE measures the 10 items in the teamwork climate domain of the SCORE. Pulse SCORE items were compared over time, as well as the overall scores. Results for the individual items and overall score comparisons are displayed in Table 4 and show that one item had a significant increase from session one to session two, five items had a significant increase from session two to session three, and seven items had a significant increase from session one to session three (see Table 4). The overall score was statistically significant from pre to post at $p < .001$.

Table 4

Pulse SCORE Traditional Group Statistical Results. *Significance (Sig) equals the p-value.*

Item	Pulse 1 Median	Pulse 2 Median	Pulse 3 Median	Pulse 1 to 2 Sig.	Pulse 2 to 3 Sig.	Pulse 1 to 3 Sig.
Item 1	4.00	4.00	5.00	0.34	0.09	0.02
Item 2	4.00	4.00	5.00	0.01	0.04	0.00
Item 3	5.00	5.00	5.00	0.46	0.46	0.12
Item 4	4.00	5.00	5.00	0.22	0.60	0.10
Item 5	3.00	3.00	4.00	0.40	0.01	0.00
Item 6	3.00	3.00	4.00	0.58	0.00	0.00
Item 7	3.00	3.00	4.00	0.56	0.00	0.00
Item 8	4.00	4.00	5.00	0.80	0.09	0.05
Item 9	4.00	4.00	5.00	0.71	0.04	0.02
Item 10	4.00	5.00	5.00	0.14	0.52	0.04
Pulse SCORE Overall	3.70	3.80	4.35	0.16	0.01	0.00

Pulse SCORE Makeup Group

Sixteen participants completed the first Pulse survey for a response rate of 100%. Ten of the 12 completed the second survey for a response rate of 83%. All 12 participants completed the third Pulse survey for the makeup group for a response rate of 100%.

The Pulse SCORE measures the 10 items in the teamwork climate domain of the SCORE. Pulse SCORE items for the makeup group were compared over time, as well as the overall scores. Results for the individual items and overall score comparisons are displayed in Table 5 and show that eight items from session two to session three had a

significant increase, and 10 items had a significant increase from session one to session three (see Table 5). The overall score was statistically significant from pre to post at $p < .001$.

Table 5

Pulse SCORE Makeup Group Statistical Results Significance (Sig) equals the p-value.

Item	Pulse 1 Median	Pulse 2 Median	Pulse 3 Median	Pulse 1 to 2 Sig.	Pulse 2 to 3 Sig.	Pulse 1 to 3 Sig.
Item 1	4.50	5.00	5.00	0.22	0.20	0.01
Item 2	4.00	5.00	5.00	0.53	0.01	0.00
Item 3	4.00	5.00	5.00	0.25	0.01	0.00
Item 4	4.50	4.50	5.00	0.98	0.00	0.00
Item 5	3.00	4.00	5.00	0.73	0.00	0.00
Item 6	4.00	3.00	5.00	0.60	0.00	0.00
Item 7	3.00	2.50	5.00	0.51	0.00	0.00
Item 8	4.00	4.50	5.00	0.45	0.01	0.00
Item 9	4.00	5.00	5.00	0.10	0.20	0.00
Item 10	4.00	5.00	5.00	0.24	0.01	0.00
Pulse SCORE Overall	3.95	4.20	4.90	0.64	0.01	0.00

Pulse SCORE Combined Groups

The Pulse SCORE measures the 10 items in the teamwork climate domain of the SCORE. Pulse SCORE items were compared over time, as well as the overall scores in the combined groups. Results for the individual items and overall score comparisons are displayed in Table 6 and show that one item had a significant increase from session one to session two, four items had a significant increase from session two to session three,

and eight items had a significant increase from session one to session three (see Table 6). The overall score was statistically significant from pre to post at $p < .001$.

Table 6

Pulse SCORE Combined Groups Statistical Results. Significance (Sig) equals the p-value.

Item	Pulse 1 Median	Pulse 2 Median	Pulse 3 Median	Pulse 1 to 2 Sig.	Pulse 2 to 3 Sig.	Pulse 1 to 3 Sig.
Item 1	4.00	4.00	5.00	0.38	0.02	0.00
Item 2	3.00	4.00	5.00	0.01	0.62	0.01
Item 3	5.00	5.00	5.00	0.35	0.13	0.01
Item 4	4.00	5.00	5.00	0.33	0.10	0.01
Item 5	3.00	3.00	4.00	0.38	0.21	0.06
Item 6	2.00	3.00	3.00	0.47	0.30	0.14
Item 7	3.00	2.50	4.00	0.71	0.02	0.04
Item 8	4.00	4.00	5.00	0.88	0.01	0.01
Item 9	4.00	5.00	5.00	0.57	0.01	0.00
Item 10	4.00	5.00	5.00	0.27	0.15	0.01
Pulse SCORE Overall	3.50	3.79	4.00	0.16	0.05	0.00

SCORE Results for All Phases

One hundred and thirty-five participants of the 155 team members completed the May 2016 SCORE survey with a response rate of 87%. Seventy-four completed the three-month survey with a response rate of 48% and 135 completed the six-month survey with a response rate of 87%. The SCORE instrument is reported as percent of positive responses. In Table 7 below the pre, three, and six month post data are displayed. Six of

the domains improved from pre to three months post, with six domains improving from pre to six months post (see Table 7). Three domains increased from three months post to six month post with one domain sustaining the improvement from three to six months (see Table 7).

Table 7

SCORE Statistical Results: Percent Positive

Domain	Pre May 2016 % Positive	3 Months Post October 2016 % Positive	6 Months Post January 2017 % Positive
Learning Environment	62%	72%	60%
Local Leadership	53%	62%	62%
Burnout Climate	50%	49%	43%
Personal Burnout	39%	40%	29%
Teamwork Climate	58%	76%	65%
Safety Climate	59%	70%	66%
Work Life Balance	63%	72%	80%

SCORE Overall Domain Results

Comparisons over time are displayed in Table 8 for the SCORE survey. Table 8 shows a significant increase in two domains from pre implementation to three months post, a significant increase in one domain from three to six months, and a significant increase in four domains from pre to six months (see Table 8). The teamwork climate had a statistically significant increase between pre implementation and three months post and from pre to six months post (see Table 8). The safety climate trended in the right direction from pre to three months post and from pre to six months post implementation, however was not statistically significant (see Table 8).

Table 8

SCORE Overall Domain Statistical Results. Significance (Sig) equals the p-value.

Domain	Pre to 3 Month Median	3 Month to 6 Month Median	Pre to 6 Month Median	Pre to 3 Month Sig.	3 Month to 6 Month Sig.	Pre to 6 Month Sig.
Learning Environment	79.17	87.50	83.33	.19	.46	.54
Psychological Safety	75.00	80.36	78.57	.45	.88	.31
Employee Burnout	47.50	40.00	40.00	.59	.26	.04
Personal Burnout	30.00	25.00	15.00	.54	.20	.02
Teamwork	64.29	71.43	75.00	.02	.80	.01
Safety	71.43	82.14	85.71	.08	.93	.05
Work Life Balance	1.71	1.71	1.57	.67	.05	.01
Local Leadership	75.00	80.36	78.57	.45	.89	.31

SCORE Teamwork and Safety Climate Legacy Domains Results

The SCORE survey was administered at the organization in May of 2016 which included three additional teamwork questions from the original instrument that were historical questions for the organization. These questions were included on previous tools to assess climate and culture and are referred to as legacy questions. One additional question was designated as a legacy question for the safety climate that represents the historical question utilized on the previous tools. Inclusion of these questions in the domain for teamwork and safety climate was analyzed to stay consistent with the way the organization defined the overall domain. The SCORE teamwork and safety climate legacy domain comparisons over time are displayed in Table 9 and show a significant increase in teamwork climate from pre to three months post and in teamwork climate

from pre to six months post (see Table 9). The safety climate scores over time were not statistically significant.

Table 9

SCORE Teamwork and Safety Climate Domain with Legacy Questions Statistical Results. Significance (Sig) equals the p-value.

Domain	Pre to 3 Month Median	3 Month to 6 Month Median	Pre to 6 Month Median	Pre to 3 Month Sig.	3 Month to 6 Month Sig.	Pre to 6 Month Sig.
Team Work Climate	79.17	86.25	87.50	.02	.90	.01
Safety Climate	78.57	82.82	84.38	.15	.94	.12

SECTION VIII

Discussion of Results

All five domains, team structure, leadership, situation monitoring, mutual support, and communication on the T-TPQ showed statistically significant improvement in the traditional group. Therefore, team training positively increased teamwork perception. In the makeup group, eight items and two of the domains showed statistically significant improvement post training. Due to low number of participants, the results are not as predictable. When combining the groups, all five domains and the overall score showed statistically significant improvement.

The teamwork climate positively increased in the Pulse SCORE post education intervention in both the traditional and makeup group. This showed that training positively impacted the teamwork climate in the ambulatory oncology team. Improvement is seen over time, showing the training successfully progressed from session one to session three. CUS and briefs were the first two tools implemented in these areas, followed by huddles, debriefs, and SBAR.

Four domains in the SCORE that make up the overall safety culture had a statistically significant improvement with three domains trending in the right direction towards improvement. The teamwork climate showed a statistically significant improvement post education intervention. Improvements in the safety climate were not statistically significant, however trended towards goal post training at six months post intervention. Only one domain, learning environment, did not show improvement on the SCORE. This could be due to the way the team functions in the ambulatory oncology department. This team consistently raises the bar when it comes to patient safety and

experience. Learning about strategies and tools in the education intervention the team was not currently using, raised awareness of opportunities for improvement. When rounding in the departments post the six-month survey, many members of the team expressed excitement about recent debriefs that have occurred after events where the team was able to come together and learn how to react more efficiently the next time. It can take time for tools and strategies to become embedded into the culture of a department, therefore the timeline for this project may not reflect the full culture change that is taking place in the ambulatory oncology environment.

SECTION IX

Recommendations

Limitations

The project design segmented the education intervention into three sessions, which did not facilitate completion of the content for many participants due to competing priorities and increase in patient volume. This led to makeup sessions for the education intervention that were scheduled after some of the ambulatory oncology areas had implemented tools learned from the education sessions. Potentially, the survey responses in the makeup group could be influenced by the implementation of the tools in the clinical areas prior to the makeup participants' completion of the content.

The SCORE survey conducted three months post intervention had a low response rate at 47%. The response rate affects the data as the 60% representation of the group was not achieved. Competing priorities, opening of the newly renovated clinic, and survey fatigue played a part in the low response rate. Many individuals claimed to have taken the survey when rounding in the clinics; however, confusion about the need to repeat the survey was discovered after the survey closed.

Recommendations for Improvement

Due to competing priorities and increased volume in the ambulatory oncology clinics at the time of the project implementation, further investigation of the project design is recommended. Comparing the results from two project designs, one utilizing one session for the entire content versus segmenting the content into three sessions, could facilitate further information gained about optimal training design.

In addition, the SCORE survey should be administered at different time intervals such as one-year post intervention to assess change and sustainability. Safety climate and learning environment scores can dip after education due to raising awareness with participants about high reliability, optimal safety practices, communication, and teamwork. The three month SCORE survey had a low response rate, however showed improvement in some of the domains. Evaluating the timing of surveys should be considered. It takes time to change the culture of a department; therefore, the three month survey may not be the best timeframe to assess culture change.

Sustainability

Reinforcement of the tools through discussion, sharing examples, and discussing when and how to use the tools will keep the training in the forefront for the staff. Through the use of coaches, discussion and perspective sharing regarding TeamSTEPPS® and tool usage continues to sustain the culture change. Providing continued support to the designated project coaches will also facilitate use of the tools in the ambulatory oncology clinics. Highlighting the examples from the clinical environment in newsletters, staff meetings, and during briefs and huddles will keep the initiative in the spotlight in the organization. Evaluating the decline in the SCORE survey results from three month to six months despite the low response rate at three months will be investigated with possible measurement at the one year post intervention. Sustainment activities and discussion of further tool usage will continue to occur through the engagement with the leadership team and the coaches.

Next Steps

Next steps for the ambulatory oncology departments include training patients and family members on TeamSTEPPS® in order for all members of the team to share a common language when it comes to patient safety. In collaboration with the oncology Patient Advisory Council, planning for the patient education TeamSTEPPS® project is in progress.

Administering the SCORE and T -TPQ to participants at one year post implementation to assess sustainability and enculturation of the tools is under discussion in the organization. Further statistical analysis with the data set collected will be examined. Comparisons via clinic site, position, years of service, and per shift to lend further information on the effectiveness of the intervention are being considered.

Dissemination of results with the participants will be scheduled via grand rounds sessions or staff meetings. Further dissemination via abstract submission to the annual patient safety conference at the organization, National TeamSTEPPS® conference, and the Magnet conference will be pursued. Publication of project results via professional journal submission will also be explored.

SECTION X

Implications for Practice

Nurses prepared as doctors of nursing practice (DNP) can positively influence organizational and patient outcomes by translating theory and evidence into practice (Roberts, 2013). DNP prepared nurses are essential to improving the healthcare system and health of the communities served (Melnyk, 2013). This project utilized evidence to deploy an intervention that improved organizational outcomes.

Interprofessional team training is needed to enhance communication and teamwork, ultimately enhancing the safety climate and reducing patient safety events. The total number of patient safety events decreased to four for fiscal year 2017 to date from 13 the previous year and 10 in fiscal year 2015. Of the 13 the previous year, six of the events resulted in an RCA with eight in 2015 due to severity level. In fiscal year 2017, zero RCAs have been performed to date. If the trend continues the organization will save approximately $92,561.08 dollars after training. Therefore, interprofessional team training is a cost effective mechanism to enhance teamwork perception, elements that make up the safety culture (psychological safety, employee burnout, personal burnout, teamwork climate, safety climate, work life balance, and local leadership), and patient safety.

Utilizing coaches to reinforce learning and implementation of tools in the clinical environment facilitated translation of evidence into practice for the ambulatory oncology departments. This project revealed improvement in teamwork perceptions, in the teamwork climate, and in patient safety events post intervention with cost savings for the organization after the cost of training, demonstrating a return on investment.

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Appendix A

Scope of Project

Project Description:
This project is designed to enhance the safety climate in the ambulatory oncology clinics by providing team training. The education will consist of Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®). The SCORE survey and the TeamSTEPPS® Teamwork Perception Questionnaire (T-TPQ) will be utilized pre and post intervention to measure teamwork and safety perceptions. Patient safety events will be analyzed and compared pre and post intervention.

Project Purpose:
The project's purpose is to enhance awareness of organizational learning in regards to patient safety and through TeamSTEPPS® training create a climate of psychological safety. This project aligns with the organization's mission to improve health, advance knowledge, and inspire hope. The organization's vision of being the trusted leader in health care through outstanding quality, an unparalleled patient experience, innovative care delivery, and commitment to the community is supported by the project. The training addresses the organization's values of excellence, safety, integrity, diversity, and teamwork. This project will provide further support for the organization's commitment to zero harm.

Desired Outcomes:
A desired outcome would be an enhanced safety culture reflected on the SCORE safety survey with an improvement on identified questions or domains related to safety and teamwork. An increased score on the post assessment survey of the T-TPQ and a reduction of patient safety events requiring a Root Cause Analysis (RCA) due to severity level of harm are also desired outcomes from this project.

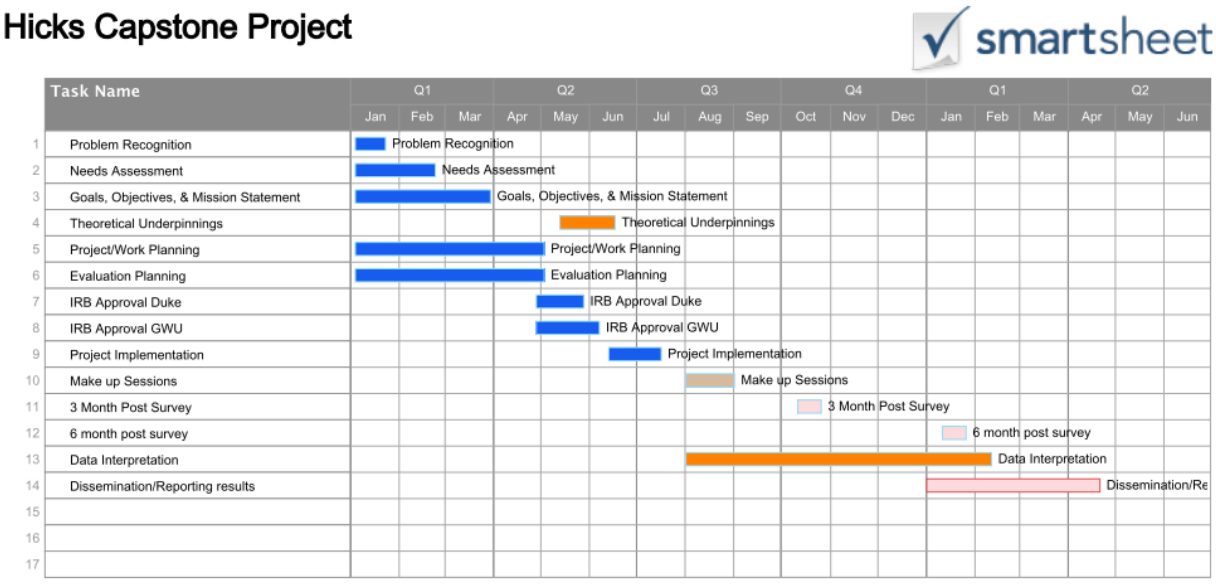
Project Boundaries:
This project will provide TeamSTEPPS® training to the ambulatory oncology clinics. The safety culture survey results and patient safety events will be analyzed pre and post intervention. The T-TPQ will be administered prior to the intervention and post intervention to measure teamwork perceptions. This project will teach staff the tools; however, it cannot ensure staff will utilize the tools or display teamwork behaviors. This project will not address clinical decision making by healthcare providers, which can potentially affect safety events in the oncology clinics.

Project Scope Statement:
The SCORE safety results, RCAs, and Learning from Defects (LDF) events in the ambulatory oncology clinics confirm the organization has an obligation to improve the safety climate and enhance patient safety. The desired goal of the project is to enhance the safety climate by increasing post intervention scores on the safety culture survey and T-TPQ, and by decreasing patient safety events resulting in patient harm. The CNO and ACNO will serve as project sponsors. The ambulatory oncology leadership team and identified staff coaches will be team members. If the organization reduces one medical error as a result of training, the organization will save approximately $3111.99 after the cost of training.

Appendix B

Project Timeline and GANTT Chart

Task Name	Start Date	End Date	Duration	% Complete	Status
Problem Recognition	01/04/16	01/22/16	**15d**	**100%**	**Completed**
Needs Assessment	01/04/16	02/23/16	37d	**100%**	**Completed**
Goals, Objectives, & Mission Statement	01/04/16	03/29/16	62d	**100%**	**Completed**
Theoretical Underpinnings	05/13/16	06/16/16	25d	**100%**	**Completed**
Project/Work Planning	01/04/16	05/02/16	86d	**100%**	**Completed**
Evaluation Planning	01/04/16	05/02/16	86d	**100%**	**Completed**
IRB Approval Duke	04/28/16	05/27/16	22d	**100%**	**Completed**
IRB Approval GWU	04/28/16	06/06/16	28d	**100%**	**Completed**
Project Implementation	06/13/16	07/15/16	25d	**100%**	**Completed**
Make up Sessions	08/01/16	08/31/16	23d	**100%**	**Completed**
3 Month Post Survey	10/11/16	10/25/16	11d	**100%**	**Completed**
6 month post survey	01/11/17	02/01/17	11d	**100%**	**Completed**
Data Interpretation	08/01/16	02/10/17	140d	**100%**	**Completed**
Dissemination/Reporting results	01/01/17	04/20/17	80d		**In Progress**



Appendix C

TeamSTEPPS® Teamwork Perception Questionnaire (T-TPQ)

Question	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
Team Structure					
The skills of staff overlap sufficiently so that work can be shared when necessary.					
Staff are held accountable for their actions.					
Staff within my unit share information that enables timely decision making by the direct patient care team.					
My unit makes efficient use of resources (e.g., staff, supplies, equipment, information).					
Staff understand their roles and responsibilities.					
My unit has clearly articulated goals.					
My unit operated at a high level of efficiency.					
Leadership					
My supervisor/manager considers staff input when making decisions about patient care.					
My supervisor/manager provides opportunities to discuss the unit's performance after an event.					
My supervisor/manager takes time to meet with staff to develop a plan for patient care.					
My supervisor/manager ensures that adequate resources (e.g., staff, supplies, equipment, information) are available.					
My supervisor/manager resolves conflicts successfully.					
My supervisor/manager models appropriate team behavior.					

My supervisor/manager ensures that staff are aware of any situations or changes that may affect patient care.					

Question	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
Situation Monitoring					
Staff effectively anticipate each other's needs.					
Staff monitor each other's performance.					
Staff exchange relevant information as it becomes available.					
Staff continuously scan the environment for important information.					
Staff share information regarding potential complications (e.g., patient changes, bed availability).					
Staff meets to reevaluate patient care goals when aspects of the situation have changed.					
Staff correct each other's mistakes to ensure that procedures are followed properly.					
Mutual Support					
Staff assist fellow staff during high workload.					
Staff request assistance from fellow staff when they feel overwhelmed.					
Staff caution each other about potentially dangerous situations.					
Feedback between staff is delivered in a way that promotes positive interactions and future changes.					
Staff advocate for patients even when their opinion conflicts with that of a senior member of the unit.					
When staff have a concern about patient safety, they challenge others					

until they are sure the concern has been heard.					
Staff resolve their conflicts, even when the conflicts have become personal.					
Question	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
Communication					
Information regarding patient care is explained to patients and their families in lay terms.					
Staff relay relevant information in a timely manner.					
When communicating with patients, staff allow enough time for questions.					
Staff use common terminology when communicating with each other.					
Staff verbally verify information that they receive from one another.					
Staff follow a standardized method for sharing information when handing off patients.					
Staff seek information from all available sources.					

Appendix D

Cost Benefit Analysis

Patient safety in the ambulatory oncology environment: A TeamSTEPPS journey				
Training items	Time	Average salary cost/hr	Number of nurses	Total cost
Class time	2.25	$31.52	54	$3,829.68
Training items	Time	Average salary cost/hr	# of radiation therapists	Total cost
Class time	2.25	$33.56	11	$830.61
Training items	Time	Average salary cost/hr	# of pharmacists	Total cost
Class time	2.25	$55.12	4	$496.08
Training items	Time	Average salary cost/hr	# of PRMO	Total cost
Class time	2.25	$15.41	11	$381.40
Training items	Time	Average salary cost/hr	# of APPs	Total cost
Class time	2.25	$75.07	8	$1,351.26
Training items	Time	Average salary cost/hr	# of physicians	Total cost
Class time	2.25	$80.07	12	$2,161.89
Class Materials		Cost	# needed	Total cost
TeamSTEPPS pocket guides		$1.00	100	$100.00
I need Clarity Cards		$1.00	100	$100.00
SBAR Cards		$1.00	100	$100.00
Handouts		$0.22	100	$22.00
Materials for activities		$3.50	4	$14.00
			Total training costs	$9,722.92
Average cost of Medical errors		# of RCAs & LFDs last year		Total Cost
$11,366		13		$147,758

If training reduces patient safety events resulting in the reduction of RCAs	# of medical errors reduced	Cost	Cost savings
	1	$11,366	$11,366
	2	$11,366	$22,732
	3	$11,366	$34,098
	4	$11,366	$45,464
	5	$11,366	$56,830

Total training costs	# of medical errors reduced	Cost savings	Total organizational cost savings
$9,722.92	1	$11,366	$1,643.08
$9,722.92	2	$22,732	$13,009.08
$9,722.92	3	$34,098	$24,375.08
$9,722.92	4	$45,464	$35,741.08
$9,722.92	5	$56,830	$47,107.08

Appendix E

Project Plan

Question: In the ambulatory oncology team, how does team training affect the culture of safety and patient safety events six months after training?

Population: Ambulatory Oncology Service line in a community hospital associated with a larger health system. Multiple disciplines will be represented: Physicians, Advanced Practice Providers, Nurses, Certified Medical Assistants, Nursing Assistants, Patient Revenue Management employees, pharmacist, lab personnel, and radiation therapists.

Design: Quality improvement project

Sample: Goal is to meet at least 80% of the population which would be 136 people or more would participate.

Project design: Coaches will be identified in the areas to provide in the moment coaching and positive reinforcement of the TeamSTEPPS® tools. Coaches will be identified by department leadership and receive TeamSTEPPS® Essential training. Coaches will observe briefs, huddles, debriefs and be in the clinical areas to serve as a resource for TeamSTEPPS® Implementation. Coaches will provide positive reinforcement to staff when using the TeamSTEPPS® tools and offer suggestions on when to use TeamSTEPPS® to team members.

1. SCORE safety climate survey is being conducted by the organization in May 2016
2. 45 minute education sessions (Nine sessions will be offered per topic due to scheduling and number of people who will attend.):
    a. TeamSTEPPS® Teamwork Perception Questionnaire T-TPQ will be administered via Qualitrics at start of Education session one:
        Content: What is TeamSTEPPS® & CUS (I am Concerned, I am Uncomfortable, this is a Safety issue)
    b. Two weeks later the Pulse SCORE will be administered by Safe & Reliable Healthcare (the organization that currently administers the SCORE survey currently being conducted organizational wide) via a link to subjects email at start of education session two:
        Content: Review of tools and sharing stories, Briefs, Huddles, Debriefs
    c. Two weeks later the Pulse SCORE will be administered by Safe & Reliable Healthcare via a link to subjects email at the start of education session three:

Content: Review of tools and sharing stories, Situation, Background, Assessment, Recommendation (SBAR), T-TPQ post

d. Two weeks later the Pulse SCORE will be administered by Safe & Reliable Healthcare via a link to subjects email
e. SCORE will be administered by Safe & Reliable Healthcare via a link to subjects email three months post education session three
f. SCORE will be administered by Safe & Reliable healthcare via a link to subjects email six months post education session three

Data Collection Plan: Tools utilized: Teamwork perception tool: TeamSTEPPS® Teamwork Perceptions Questionnaire (T-TPQ) administered via Qualtrics. Instrument reliability Cronbach's $\alpha = 0.978$. Safety Culture tool: Safety, Communication, Operational Reliability, and Engagement (SCORE) and the Pulse SCORE (abbreviated version) instrument administered by Safe & Reliable Healthcare. Instrument reliability .820-.964 for statistical data for each domain.
Safety events: Will track the number of Root Cause Analysis (RCA) and Learning From Defects (LFD) and severity level conducted pre and post intervention - no patient identification details will be reviewed or tracked.

Timeline:

- TeamSTEPPS® Teamwork Perception Questionnaire at start of Education session one
- Two weeks later Pulse SCORE (abbreviated version of the SCORE) and education session two
- Two weeks later Pulse SCORE and education session three, TeamSTEPPS® Teamwork Perception Questionnaire at end of Education session three
- Two weeks later Pulse SCORE
- SCORE at three months post last education session
- SCORE at six months post last education session

Evaluation Plan: Preliminary, group comparison, and repeat measure analysis with appropriate follow-up analyses were used to evaluate project outcomes. Preliminary included standard tests of normality, descriptive statistics and correlations across all composites within each outcome measure. Group comparison analyses tests were performed depending on tests of normality. Repeat measure analyses depending on tests of normality were performed.

Protected Health Information: Safety events: Will track the number of Root Cause Analysis (RCA) and Learning From Defects (LFD) and severity level conducted pre and post intervention - no patient identification details will be reviewed or tracked.

Privacy, Data Storage & Confidentiality:

- No patient or PHI will be collected for this project.

- Qualtrics will be utilized to complete the TeamSTEPPS® Teamwork Perception Questionnaire. Identifying information will not be collected as part of this survey. Results will be stored electronically.
- For the SCORE and Pulse SCORE, Safe & Reliable Healthcare will administer the survey. Participant's demographics and employee Unique ID is collected however removed from the
  individual response and only aggregate reports will be provided to the organization and project leads. Results will be stored electronically.
- No PHI will be collected or stored.