Summer 8-5-2020

Tele Critical Care Implementation and Education Project

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Practicum Prospectus: Tele Critical Care Implementation and Education Project

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Abstract

Problem: The intensive care unit has the highest rate of mortality and patient care costs in the hospital. There are significant challenges in improving care and controlling costs. One solution adopted by many healthcare organizations is intensive care telemedicine. Commonly known as eICUs or Tele Critical Care (TCC). These specialty units provide access to intensivists and nurses 24-hours a day and has shown success in reducing mortality and length of stay while providing cost savings.

Challenges exist in introducing telemedicine to a new setting. Barriers identified are high initial cost of equipment, competing priorities for resources, and nurse acceptance. The purpose of this paper is to focus on improving RN acceptance and perceived usefulness of telemedicine technology by providing staff education through a live class to introduce and familiarize staff with the benefits and rationale for implementing TCC in the target unit.

Context: An 8-bed ICU located in a 50-bed medical center was selected as the target unit for this project. The study population consists of ICU nurses regularly staffed to the unit who will have regular interactions with TCC.

Intervention: A pre and postsurvey using a validated tool, the TCC Implementation Survey, was envisioned for use in this project. These data will inform the direction and content of the educational component. Additional data from ICU quality reports could also guide development of the presentations. The postsurvey would be administered following the class. The goal of this project is to increase staff acceptance and perceived usefulness by 15% above presurvey levels with a 75% attendance rate in class and 80% response rate to the survey.

It was intended for the project to go forward contemporaneously with TCC implementation. Due to impacts of the COVID-19, TCC implementation was halted and the

initial plan could not go forward. Also, discussions with union-represented employees did not occur, preventing their participation as a survey group. As a substitute, a small convenience sample of non-represented employees was selected; however, due to IRB concerns for anonymity, the original survey could not be used with this group. A modified qualitative survey was selected and administered to this cohort. The 25-question survey focused on areas of quality, safety, communication, availability of ICU consultation, and clinical decision making. The small sample size of nine participants limited making statistically significant conclusions regarding the results, but the impressions given by the responses give insight into staff acceptance and opportunities to improve care.

Results: The results were graded on a scale of 1 (strongly disagree) to 5 (strongly agree). Of note, the question, "I think new technology would diminish independence in my practice," was found to have the lowest score of 2.4, indicating the staff seem receptive to new technology. In the sections, "Safety climate in your ICU" and "Quality outcomes in your ICU," the lowest scores were regarding RNs' (3.2) and doctors' (3.1.) rounding on the unit, showing a possible need for improvement. Clinical decision-making at night found a positive association regarding the management of antibiotics and pain and sedative medication, with scores of 4.2 in each category. Whereas, the decision to intubate had the lowest mark in this section (3.6). An indication that decision-making in this area may need to be supported.

Conclusions: The initial planning and tools are readily available to proceed when the TCC program resumes. Utilizing the modified survey allowed some data gathering and provided insights into the ICU staff's perceived needs and perceptions of technology. Going forward, the design of this project could be used to support new-hire onboarding and provide a refresher to staff during annual skill events.

Section II: Introduction

Ever since the publication of *To Err is Human: Building a Safer Health System* (Institute of Medicine, 2000) brought to light that up 98,000 people a year die as a result of avoidable harm in hospitals and healthcare settings in the United States, the manner in which healthcare identifies and approaches the issue of patient safety and avoidable harm has fundamentally shifted. Nowhere in healthcare is the issue of patient mortality more acute than in the intensive care unit (ICU). Having the highest mortality rate in the hospital (10%-20%), as well the highest costs in healthcare (4.1% of all spending or an estimated $107 billion annually), there is a clear need to improve care and reduce avoidable harm from both a humanistic and financial perspective.

Contemporaneously, the number and acuity of critically ill patients has been increasing, while the supply of critical care physicians available to care for this vulnerable population has been decreasing (Network for Excellence in Health Innovation [NEHI], 2011). The issue of job attrition is not a physician-only problem. As our population ages, so do many of the nation's experienced critical care nurses. It is projected that as many as one million of the nation's current 3.8 million registered nurses (RNs) will retire between 2020 and 2030, and with them, their years of experience will disappear from practice (Buerhaus et al., 2017).

Problem Description

The challenge is how does the healthcare system address the increasing need for more and better care, while at the same time dealing with a shrinking workforce. A solution adopted by some healthcare organizations is the use of telemedicine in the ICU setting. Developed as a method of bringing critical care expertise to the bedside, ICU telemedicine units, also known as electronic ICUs (eICUs) or tele critical care (TCC), are staffed with board-certified critical care

physicians and experienced critical care nurses who are able to monitor patients from remote locations. As part of the ICU team, these professionals are able to evaluate labs and studies, place orders, and evaluate compliance with evidence-based practice standards in the ICU (Canfield & Galvin, 2018). This technology has had demonstrated success. In a rapid demonstration project at the University of Massachusetts Memorial Medical Center (UMMMC) and two affiliated community hospitals, there was shown to be a decrease in mortality of 20% at UMMMC and 36% decrease in the community sites, while at the same time, patient acuity increased, as determined by APACHE III score. In addition, ICU length of stay decreased by 30% overall (NEHI, 2011, p. 3).

Seeing the benefits of introducing this technology, a large healthcare system in Northern California has undertaken a project to implement TCC in all 21 medical centers in the region. With the potential benefits, barriers still exist to successful implementation of tele-ICU technology. Those barriers identified in the literature range from initial high capital cost, competing priorities for information technology project financing, and physician resistance (NEHI, 2011). In addition to these significant challenges is the issue of ICU nurse acceptance. As the end-user of this technology, the bedside nurse plays a critical role in the success of any tele-ICU program. Concerns identified by nurses are of perceived intrusiveness of tele-ICU monitoring, the sense that they are being spied upon, and the possible impact of the tele-ICU on current workflows (Canfield & Galvin, 2018).

The system setting targeted by this project is an 8-bed ICU located in a small urban medical center. This 50-bed facility is in an inner-city community, which serves a mixed population of both health plan members and non-members. This ICU has intensivist coverage

from 8:00 a.m. to 8:00 p.m. daily, with on-call coverage after hours, and a high rate of bed utilization (approximately 80% occupancy).

Available Knowledge

PICOT Question

(P) In critical care nurses, (I) how does an educational intervention effect perception of usefulness and ease of use of tele critical care technology (C), compared to pre-implementation attitudes?

Available Evidence

An electronic search process was undertaken to determine the current state of evidence regarding ICU telemedicine. Searches were conducted via CINAHL and PUBMED databases using the search terms *eICU* and *ICU telemedicine.* This search yielded 54 results, with 14 related to the subject. Of those, six were deemed relevant to the project goals, with three directly examining the issue of telemedicine presence and three examining staff attitudes toward the introduction of new technologies in the healthcare setting. Two industry reports supporting tele-ICU were also included for review, as they provided a general context and some evidence supporting the use of this technology. An evaluation table of the accepted materials was completed and is available in Appendix A.

Two reports produced by NEHI show support for the use and expansion of ICU telemedicine. In 2011, NEHI asserted that the use of tele-ICU produced significant cost savings, as well as a demonstrable reduction in mortality (as much as 40%) and ICU length of stay (25%). The 2013 NEHI report advocated expanding coverage of tele-ICU to rural and critical access hospitals, rotating clinicians through hospital and non-clinical settings to enhance communication and build relationships with bedside staff.

In a mixed-methods study examining the introduction of a new acute stroke telemedicine service, Bagot et al. (2020) performed a pre- and post-implementation study with a limited number of semi-structured interviews. Their findings supported the conclusion that nurses play an influential role in implementing and sustaining a complex new system, such as acute telemedicine, and that attitudes toward a new technology can shift after implementation. It was also noted that tailored pre-implementation strategies, such as clinical support and education, were important factors in successful implementation (Bagot et al., 2020). In a review of the history of ICU telemedicine and its acceptance by bedside nurses, Canfield and Galvin (2018) also advocated for the use of tele-ICU technology, while also noting barriers to acceptance, such as concerns for privacy and perceived intrusiveness.

Kowitlawakul (2011) surveyed a pool of 117 nurses' intention to use eICU technology and was able to validate the use of the Technology Acceptance Model (TAM) as an effective tool in explaining nurses' decision to accept a new technology and their intention to use eICU technology. In addition, Kowitlawakul noted that to support autonomy and competency, educational opportunities should be presented to allow adaptation to new technologies.

Three articles were included to demonstrate the validity of the TAM as a tool to gauge healthcare workers' intention to use, their perceived ease of use, and the perceived usefulness of a given technology. These measures are widely accepted as determinants to overall acceptance of a given technology. Although not specific to ICU telemedicine, these studies can serve to show barriers and possible approaches to influence behavior of staff to embrace new technologies.

Mussa et al.'s (2019) study of a small cohort of respiratory therapists used an educational intervention involving lecture and small group interactions. A pre- and post-survey based on TAM showed an improvement on staff knowledge and intention to use on newly introduced

medical early warning score. Schnall and Bakken (2011) examined the applicability of TAM on HIV case managers' intention to use an electronic charting system. In a study of 94 case managers, the authors concluded that the TAM constructs were valid and could be applied to this group of healthcare workers (Schnall & Bakken, 2011). Finally, Lin (2017) examined nurses' satisfaction using a nursing information system to improve efficiency and quality of care. Utilizing surveys based on the TAM and the Information Systems Success Model, Lin surveyed a group of 531 RNs. The author concluded that nurses' perception of technology, perceived usefulness, and perceived ease of use were all critical determinants to their satisfaction using the system and should guide leaders in the development and adoption of new technologies.

Available evidence shows that tele-ICU technology can be used to improve the quality of care and reduce costs in the intensive care setting. In addition, staff attitudes and perceptions of new technologies introduced into their care setting can influence the usefulness and ultimate success of a tele-ICU system. The TAM has been shown to be a valid tool for assessing staff perceptions of new technologies. Finally, the interventions of providing staff education, interactive communication, and relationship building between the ICU nursing staff, leadership, and the tele-ICU team has been identified as effective and supportive to successful implementation of telemedicine modalities.

Rationale

Two models were chosen to guide the direction of this project. The first is the TAM. The TAM was originally developed by Fred Davis and Richard Bagozzi in the 1980s out of concern that workers were not using technology available to them. By examining the factors that influence individual's acceptance of and intention to use a technology, an organization can design systems to better accommodate the end-users (Holden & Karsh, 2010). Although not a

nursing theory, it has been modified for use in healthcare and focuses on the perceived ease of use, intention to use, and perceived usefulness as key measures to determine intention to use of the target audience (Kowitlawakul, 2011).

Caring science is a theory of nursing care developed by Jean Watson in 1979. The tenants are based on providing nursing care focused on compassion, loving-kindness, and respect for the individual (Watson, 2018). This framework was adopted by the healthcare system as a model for nursing care in 2010 to provide more patient- and family-centric care in its medical centers. This is achieved by supporting principles of promoting safety, comfort, engagement, nurturing, connectedness, and empowerment (Foss Durant et al., 2015).

At first glance, it may be difficult to reconcile the differing perspectives embodied by TAM and caring science, but several of Watson's caritas processes, including authentic presence, developing trusting caring relationships, allowing expression of positive and negative feelings, and creative problem solving, are all principles that could support successful implementation of TCC. It is hoped that integrating the principles of caring science into this project will support the essential elements of collaboration and communication necessary for successful implementation of TCC.

Specific Project Aim

The specific aim of this project is to involve the staff nurses in an educational intervention to improve their perceptions of TCC's usefulness and ease of use by 15% from pre-survey values.

Section III: Methods

Context

This quality improvement project will take place in an 8-bed medical ICU. This unit serves a mixed population of roughly 50% health plan members and 50% non-members. Age breakdown is estimated to be 75% greater than 70 years old. Major diagnoses in this population include sepsis, congestive heart failure, respiratory failure, and altered mentation, including alcohol withdrawal disorder and illicit drug intoxication and withdrawal.

RN staffing is dependent on census and anticipated needs. The staffing mix includes a break and relief nurse and nurses staffed at a 2:1 ratio, with a typical maximum of five RNs. This does not account for patients requiring care at an enhanced ratio, which can increase total unit staffing to six or seven RNs. Intensivist coverage consists of two physicians with overlapping schedules providing in-house coverage from 8:00 a.m. to 8:00 p.m., with a physician designated on call for after hour needs. In-house coverage after hours is provided by the onsite hospital-based specialist. Other team members include respiratory therapists and a unit clerk.

An analysis of the strengths, weaknesses, opportunities, and threats (SWOT) identified for the implementation of TCC was performed (see Appendix B). Strengths identified were 24-hour intensivist availability and improved compliance with evidence-based practice guidelines, such as electrolyte replacement, ventilator optimization, and adherence to physician orders for titration of drips. Weaknesses noted were staff and physician resistance to new technology and changed workflow and communication issues between managing physician services and TCC physicians. Opportunities anticipated would be decreases in ICU mortality, ICU length of stay, and physician and nurse workload. Threats may include labor/management conflict regarding

change in workflows, delayed implementation due to budgetary issues, and unanticipated impacts from the evolving COVID-19 situation.

Financial benefits in terms of return on investment can be anticipated beyond the initial capital cost of installation and upgrading of hardware in the ICU. The recovery of these initial funds could potentially be regained in as little as a year following implementation, with savings from $2,600 to as much as $10,000 per admission, per data derived from similar implementations (NEHI, 2011).

Intervention

The design of this quality improvement project will center upon a pre- and post-test survey derived with permission from Kowitlawakul (see Appendix C). The eICU acceptance survey will be administered anonymously to the ICU RNs in a paper and pencil format. Pre-implementation data will guide the formation of an educational component that will be composed of live classes and staff interactions.

The content of these classes will include an understanding of the purpose of TCC, including its structure, benefits, and technology involved, and introduction to the offsite team and their abilities to support the inpatient unit. Additional interactions are planned to allow expression of concerns and to ask questions regarding implementation. The format of the staff training was designed to promote communication between the implementation team and the ICU staff who will be most affected by TCC.

Fostering interactions and two-way communication between the implementation team and ICU staff through in-person classes is intended to support the caring science processes of authentic presence, building trusting relationships, and sharing of both positive and negative feelings. An additional component could also involve site visits to the TCC hub to promote team

communication between bedside and TCC staff. Following the educational component, a post-survey will be administered to determine what change to nurses' perceived usefulness and attitudes toward TCC may have occurred due to the educational intervention.

With the stated interventions in place and ready, implementation of TCC at the target site has been delayed due to the impacts of the COVID-19 pandemic. Currently, operations at the TCC have ceased, as the intensivist group staffing TCC have been re-tasked to address anticipated surges and other priorities in the clinical setting. In addition, the leadership group at the target facility has focused their energies into addressing the pandemic-related effects, which has severely limited attention to other initiatives such as this project. As a consequence, necessary negotiations with union-represented nurses have not occurred as yet, which prevents implementation of TCC and any related project such as this.

To allow for some data collection related to this project, a modified qualitative survey was rapidly adopted and has been administered to members of the management team. These include assistant nurse managers, nurse managers and nursing supervisors who will be involved in TCC operations when the program is implemented. Adopted with permission of the TCC director, the survey comprises 26 questions broken into seven sections that include nighttime availability of critical care expertise, timing of care safety climate, quality of care, communication, the role of technology, and clinical decision-making. These questions were scored on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale. Refer to Appendix C for examples of the original survey and the modified survey.

Study of the Intervention

Specific measures to be examined from this project will be derived from the results of the pre- and post-implementation survey. The survey is broken down into three sections: perceived

usefulness, nurse's attitude toward TCC, and demographic data. There is also a box allowing comments in the first two sections. From these data, average scores can be calculated gauging the results of the parameters and conclusions can be theorized. An alternate survey was adopted, as noted in the interventions section, and used a convenience sample of assistant nurse managers, nurse managers, and house supervisors who will be working directly with TCC, with planning to resume the original education and survey to all involved RNs as installation and go-live of TCC nears.

Family of Measures

The outcome measures to be tracked will be nurses' perceived usefulness and attitudes toward implementation of TCC. It is planned to have an improvement of 15% following administration of the educational component. Process measures that can be examined following these interventions could be a decrease in ICU length of stay, mortality, and ventilator days. These measures will not be available during this project, as implementation of TCC is delayed due to the current impacts caused by COVID-19. Post-implementation data collected from the Quality Chasm report will be integrated into monthly staff meetings to show areas of success, as well as opportunities for improvement. Balancing measures that could affect the project may be related to overtime and additional hours necessary for staff participation in the educational presentation. An anticipated maximum time of 30 minutes will be assumed for each class session, with additional hours dependent on consultation with ICU leadership and approval.

Ethical Concerns

Ethical concerns regarding this project are anticipated to be limited. The survey will be administered anonymously to participating staff members, and there will be no privileged health information included in this project, as individual patients will not be included; however, the

quality data as an aggregate may be used to inform development of the education plan in the future. Staff concerns will be addressed in a manner consistent with the organization's policy and procedures and in adherence with any collective bargaining agreements with involved staff. Internal Review Board (IRB) approval was not necessary for this project, as it met criteria for a quality improvement project (see Appendix D). The modified survey used was determined not to require IRB approval and was adopted in place of the original survey.

Section IV: Results

The original target group for this project was the ICU nurses staffing the target unit. This group consists of 51 RNs employed in a full-time, part-time, or per diem capacity. Owing to limitations on this project, this group was not able to be surveyed at this time. Instead, a convenience sample consisting of assistant nurse mangers, nurse managers, and house supervisors who would have direct involvement with TCC after implementation was utilized for purposes of this survey.

Of 14 possible participants from this group, nine responses were obtained, resulting in a response rate of 64%. Five identified as assistant nurse managers, two as nurse managers, and two as house supervisors. Length of time in the role ranged from six months to 15 years for assistant nurse managers, seven months and three years for managers, with house supervisors having three and six years in their roles.

Data were collected from the submitted surveys, and an average score for each question was determined by simple calculation of the sum of the score divided by the number of responses. Of note, one respondent did not answer the section on clinical decision-making; this was reflected in the calculations and scoring for that section. Although the limited sample size prevents any ability to draw statistically significant conclusions, it does offer the opportunity to get impressions of the participants' views of the care environment. Bar graphs were developed using the survey data and are displayed in Appendix E. Each question was scored separately, and a chart was created for each topic area.

The first section titled, "Nighttime availability of critical care expertise in your ICU," consisted of two questions: Question 1. All necessary information for diagnostic and therapeutic

decisions is available for me **at night**. Question 2. In matters pertaining to patient care, I have access to expert consultations in the ICU **at night**.

The average score was 3.6 and would indicate a mild to moderate agreement with the statements.

The second section, "Timing of care provided in your ICU," listed three questions: Question 3. When a patient's status changes, I get timely information regarding the change **at night.** Question 4. Patients/families are able to interact with clinical staff 24/7. 5. If a new order is needed for patient care, it can be reliably obtained in a timely manner **at night**. Notably, the highest score (4.2) was for Question 3 and indicates agreement that information on clinical changes is readily available. The lowest of the three responses (3.6) was for Question 4 and may show that increasing patient and family involvement may be an opportunity for improvement; although, the survey was conducted during restricted visiting due to COVID-19 and may be reflected in the data.

In the sections, "Safety climate in your ICU" and "Quality outcomes in your ICU," the lowest scores were regarding RNs' (3.2) and doctors' (3.1.) rounding on the unit, showing a possible need for improvement. The effect COVID-19 may play on decreasing the amount of rounding due to the need for isolation and social distancing may provide a reason for these scores. Question 7, "I think new technology will improve my ability to provide high quality care," by contrast, had the highest score (4.3) and demonstrated a consistent agreement among the group that they are receptive to new technology and feel it is beneficial to patient care.

Regarding "Communication in your ICU," the results had less than a 10% variation between RNs, respiratory therapists, and doctors. It appears the survey group felt there is sufficient communication on the unit.

The section on the role of technology in your ICU found the most agreement among the survey group. The score recorded for Question 16, “I think new technology will diminish independence in my clinical practice,” was 2.4, indicating the cohort would appear to be amenable to new technology such as TCC, with the other scores ranging between 3.8 and 4.0, showing the most consistent agreement of all sections and indicating a receptivity to new technology in the ICU.

The final section regarding clinical decision-making at night found a positive association in regards to the management of antibiotics and pain and sedative medication, with scores of 4.2 in each category. In contrast, the decision to intubate/prevent intubation found the lowest mark in this section (3.6). This could indicate that decision-making regarding airway management may need to be supported.

Although this survey model was not the intended tool for use in the project setting, the insights that may be drawn from the results could inform the TCC implementation process going forward. Conclusions would be difficult to validate, considering the limited size of the survey group; however, the impressions given from the survey data indicate the target unit may be more receptive to the introduction of new technology than may have been expected. Issues that could be seen as opportunities for improvement are those of patient and family involvement in care, physician and nurse rounding in the unit, availability of specialty consultations after hours, and decision-making for intubation and ventilatory management. Correlation of the responses of the leadership team with bedside nurses’ impressions of these topics would be of interest, as the bedside clinicians would have more interaction with TCC.

Section V: Discussion

Summary

The results of this project are not what was anticipated by the author from the outset. The shifts in clinical resources and attention caused by the COVID-19 pandemic are significant and continue to affect the entire healthcare system, including the microsystem selected for this project. With that said, the planning and development for this quality improvement project has continued and will be ready when TCC can be implemented at this site. It is foreseen that this work could be utilized in its intended role to facilitate launch of TCC and continue to be integrated into new hire orientation, as well as a refresher at annual skills for the ICU staff. By updating and integrating performance data into the lesson plan, this introduction to TCC can remain relevant beyond the initial implementation.

Several lessons were learned from this effort. First, as previously noted, unexpected circumstances can greatly affect the ability to move a project forward. Also, a project tied to a larger venture ties it to that venture's timeline and course. In addition, these unforeseen circumstances did require some level of improvisation and flexibility to derive reportable data, however limited in scope. Although the data derived were suboptimal and the project did not reach its intended potential, work was able to be completed that was relevant to the project goals.

Conclusion

As demonstrated in this paper, the concept of intensive care telemedicine has been adopted by many healthcare organizations. This modality has exhibited the ability to improve quality of care in ICUs that embrace this technology. The opportunity to decrease mortality, length of stay, and healthcare costs are significant motivations and difficult to ignore.

Implementation of an ICU telemedicine system should be approached with foresight and planning that not only takes into account the installation of the technology required, but also invests in training and building positive relationships with the bedside ICU RNs, who will be the end-users of such a system. As noted, concerns for nurse autonomy, privacy, and increased workload have been voiced by some and should be addressed in a proactive fashion. Providing staff education and training grants not only provides the opportunity for the nurses to learn about the new technology they will be using, but also allows unit leaders to engage with their staff members and build positive, trusting relationships. These ties can serve to improve care related to TCC and can enhance treatment across the ICU. Limitations of this project included the small study group, unit size, and the quality of data obtained, which reduces its usefulness to other settings.

Section VI: References

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Section VII: Appendices

Appendix A. Evaluation Table

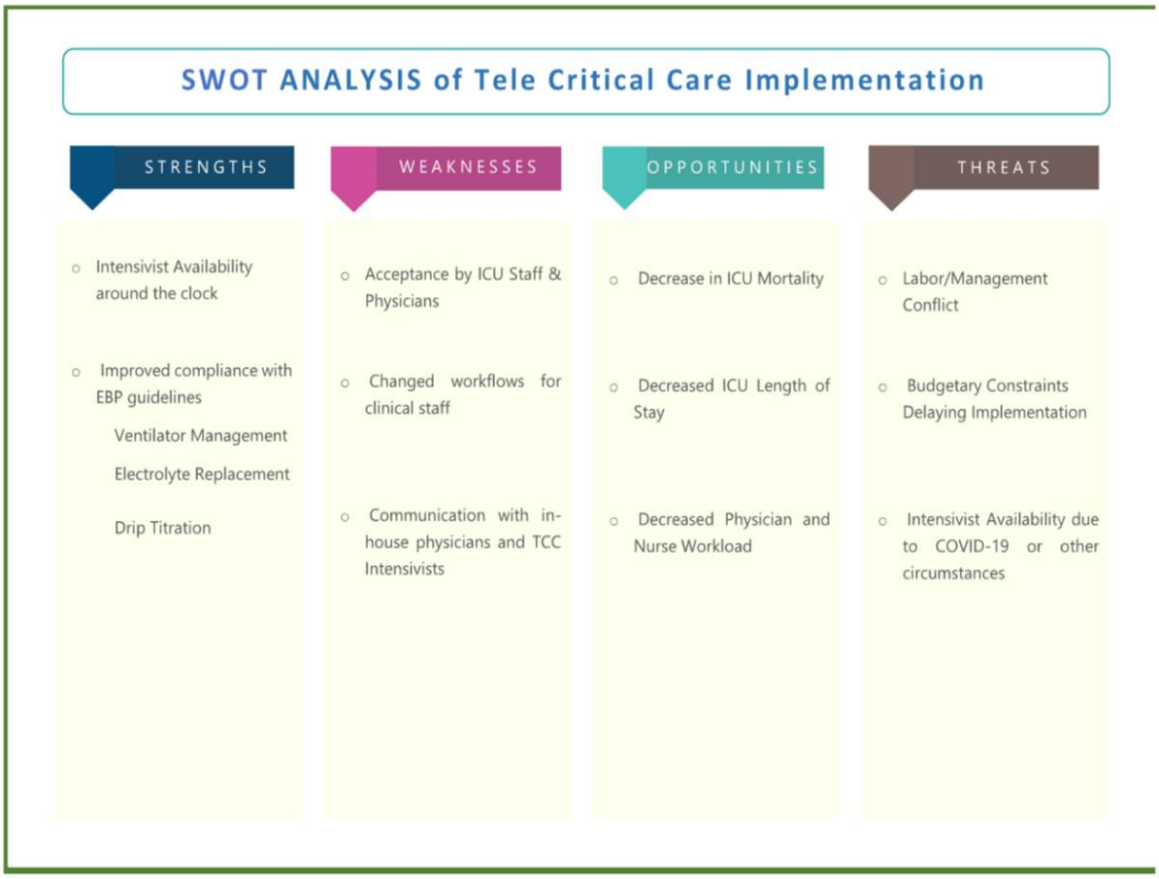
PICTO Question: P) In critical care nurses, (I) how does an educational intervention effect perception of usefulness and ease of use of tele-critical care technology (C) compared to pre-implementation attitudes?

Study	Design	Sample	Outcome/Feasibility	Evidence Rating
Kowitlawakul, Yanika. *The Technology Acceptance Model: Predicting Nurses' Intention to use Telemedicine Technology (eICU).* vol. 29, Lippincott Williams & Wilkins, Baltimore, Maryland,2011 doi: 10.1097/NCN.0b013e3181f9dd4a.	Quantitative survey utilizing the Telemedicine Technology Acceptance Model (TTAM)	139 nurses employed in units where eICU technology had not been implemented	The TTAM was shown to be a valid tool in evaluating nurses' intent to use (ITU) telemedicine technology but does not account for external variables that may affect attitudes towards technology.	III A
Kahn, Jeremy M., et al. *Adoption of ICU Telemedicine in the United States.* vol. 42, Lippincott Williams & Wilkins, Baltimore, Maryland,2014, doi:10.1097/CCM.0b013e3182a6419f.	Retrospective Study using a combined systematic listing of ICU telemedicine installations & hospital characteristics	Hospital data were drawn from multiple sources including CMS, HCRIS & MedPAR from 2002 thru 2010	The number of hospitals using ICU telemedicine increased from 16 to 213. Growth of ICU telemedicine grew at a rate of 101% during the first 4 years then slowed to 8%. Most hospitals adopting were teaching institutions and had>400 beds. Further study of slowing of ICU telemedicine is recommended.	III B

Study	Design	Sample	Outcome/Feasibility	Evidence Rating
Mussa, Constance C., Afnan Al-Raimi, and Ellen A. Becker. *Predicting Respiratory Therapists' Intentions to use the Modified Early Warning Score by using an Enhanced Technology Acceptance Model.* vol. 64, Daedalus Enterprises, Inc, Irving, Texas, 2019, doi:10.4187/respcare.06428.	Quasi-experimental study using a validated survey (TAM) pre-post and an educational intervention	Mixed cohort of 75 respiratory therapists (RTs) and students from an urban academic medical center were selected with a survey response rate of 61% (N=36).	Results suggested that adding an educational component may affect RTs knowledge, attitude and behavior toward using MEWS (P= <0.001) Limited sample size and demographics may affect generalizability.	II B
Bagot, Kathleen, et al. *Nurses' Role in Implementing and Sustaining Acute Telemedicine: A Mixed-Methods, Pre-Post Design using an Extended Technology Acceptance Model.* vol. 52, Wiley-Blackwell, Malden, Massachusetts, 2020, doi:10.1111/jnu.12509.	Mixed-methods pre-post design using TAM, some interviews & adoption of a new stroke telemedicine service in 16 hospitals from 2014-2017	Pre:77 nurses & 90 non-nurses (167) & 92 & 44(136) post involved in the care of acute stroke patients at the medical centers.	Attitudes towards acute stroke TM changed and showed an increased intent to use stroke TM. Recommendation to include training and education to insure confidence in use, Strength is design & analysis. Limitations were the qualitative component was small and completed at only one site.	II B

Study	Design	Sample	Outcome/Feasibility	Evidence Rating
Ibrahim, Sarah, et al. *Predicting Registered Nurses' Behavioural Intention to use Electronic Documentation System: In Home Care: Application of an Adapted Unified Theory of Acceptance and use of Technology Model.* vol. 32, Longwoods Publishing, Toronto, Ontario, 2019, doi:10.12927/cjnl.2019.25961	Quantitative study using cross-sectional survey evaluating ITU an EDS in home care.	217 randomly selected RNs working in home care in Ontario, Canada	Nurses were found to have a favorable impression of the benefits if using an EDS. It was theorized that new education & training may have influenced attitudes. Limitations were a limited time frame for the survey & participants' attitudes and experiences may differ from those choosing not to participate.	III B
Schnall, R., et al. *Testing the Technology Acceptance Model: HIV Case Managers' Intention to use a Continuity of Care Record with Context-Specific Links.* vol. 36, Taylor & Francis Ltd, Philadelphia, Pennsylvania, 2011, doi:10.3109/17538157.2011.584998.	Quantitative study using TAM and CCR mock-up to evaluate perceived ease of use, usefulness and barriers in using a CCR	94 HIV case managers affiliated with participating healthcare agency	Findings validated the use of the TAM & its use in anew population (HIV CMs) Limitations were possible sample size, selection bias & participants evaluated a mock-up of a CCR, not an actual system.	III B

Appendix B. SWOT Analysis and Project Planning Form



QI ESSENTIALS TOOLKIT: Project Planning Form

Before filling out the template, first save the file on your computer. Then open and use that version of the tool. Otherwise, your changes will not be saved.

Template: Project Planning Form

Team: KP Scholars Richmond **Project:** Tele Critical Care Implementation and Education Project

Driver – list the drivers you'll be working on	Process Measure	Goal
1. Nurses perceived usefulness of TCC	TTC Survey pre-/ post/ Modified qual. survey for managers	15% improvement over baseline
2. Nurse attitudes/ acceptance of TCC	TC Survey pre-/ post/ Modified qual. survey for managers	15% improvement over baseline
3. Nurse participation in process	a. Attendence/ partipation in education	70%
4.	b. Response rate to survey of participants	85%
5.		
6.		

Driver Number (from above)	Change Idea	Tasks to Prepare for Tests	PDSA	Person Responsible	Timeline (T = Test; I = Implement; S = Spread) Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14
1&2	Staff Education PPT	Creation of PPT	Trial w/ leadership group	Jeff														
3	One on one huddle	Pre-Survey	Trial w/ leadership group	Jeff														
3	One on one/ small grp	PPT & Post- Survey	Trial w/ leadership group	Jeff														
1&2	Staff education	Eval. survey data	Adjust content & method	Jeff														
1,2 & 3	Staff Ed w. ICU RN	IRB Waiver/ LMP approval	Pending TCC implemetation	Team/ Jeff														

Appendix C. Original Pre- and Post-Survey and Modified Survey

Richmond Medical Center ICU

Tele-Critical Care (TCC) Pre-Implementation Survey

(*modified with permission from Kowitlawakul's "eICU® Acceptance Survey (EAS)"

Thank you for participating in this voluntary survey. All data collected in this survey are anonymous and will not be reported on an individual basis.

This survey consists of 3 sections. Please complete all questions.

Section I: Perceived Usefulness (PU)

Direction: The following statements refer to whether TCC technology can enhance patient care. Please read each statement carefully, and then circle only one answer for each statement. 1= Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree

Items	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1. Using TCC technology would enable me to accomplish tasks more quickly.	1	2	3	4	5
2. Using TCC technology would improve my job performance.	1	2	3	4	5
3. Using TCC technology in my job would increase my productivity.	1	2	3	4	5
4. Using TCC technology would enhance my effectiveness on the job.	1	2	3	4	5
5. Using TCC technology would make it easier to do my job.	1	2	3	4	5
6. I would find TCC technology useful in my job.	1	2	3	4	5

7. Using TCC technology would improve communication on my job.	1	2	3	4	5

Please write your thoughts about TCC and your perceived usefulness of TCC in your ICU:

Section 2: Nurses' Attitudes toward TCC

Direction: The following statements refer to your attitude toward an eICU®. Please read each statement carefully, and then circle only one answer for each statement. 1= Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree

Items	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
8. The use of TCC technology improves patient care by giving the nurse more time with the patients.	1	2	3	4	5
9. TCC technology can be adapted to assist nurses in many aspects of patient care.	1	2	3	4	5
10. TCC data system offers nurses a remarkable opportunity to improve patient care.	1	2	3	4	5
11. TCC technology represents a violation of patient privacy.	1	2	3	4	5
12. TCC technology causes nurses to give less time to quality patient care.	1	2	3	4	5
13. TCC technology increases costs by increasing the nurse's workload.	1	2	3	4	5

14. TCC technology creates more problems than they solve in nursing practice.	1	2	3	4	5
15. The use of TCC technology dehumanizes nursing care.	1	2	3	4	5
16. Part of the increase in costs of health care is because of TCC technology.	1	2	3	4	5
17. Confidentiality will not be sacrificed by TCC technology.	1	2	3	4	5
18. I would be comfortable using TCC technology.	1	2	3	4	5
19. Working with TCC technology would make me very nervous.	1	2	3	4	5
20. I feel threatened when others talk about TCC.	1	2	3	4	5
21. TCC technology does not scare me at all.	1	2	3	4	5
22. I feel hostile toward TCC.	1	2	3	4	5
23. TCC technology makes me feel uneasy and confused.	1	2	3	4	5
24. I have a lot of self-confidence when it comes to working with TCC technology.	1	2	3	4	5
25. TCC technology would make nurses' job easier.	1	2	3	4	5

Please write your thoughts about how you feel TCC will impact the care that you provide to your patients:

Section III: Demographic Data

Direction: Please fill out each item and select the item that best describe you.

1) Age: (1)_____ 20-30 (2) _____ 31-40 (3) _____ 41-50 (4) _____51-60 (5) _____ 61-70
2) What shift are you working? (1) ____ day shift (2)_____ pm shift (3) ____night shift
3) Sex: (1)____ Male (2) _____Female
4) Years worked as a nurse? _____
5) Job Title? _____
6) Educational Level: Check highest degree obtained
    a. (1)_____ Diploma
    b. (2) _____ Associate Degree
    c. (4) _____BSN
    d. (5) _____ MSN
    e. (6) _____ Ph.D
    f. (7) _____other (please describe)_____
7) How many years have you worked in this hospital? _____
8) How many years have you worked in critical care unit (ICU)? _____
9) How long have you heard about TCC? _____
10) I have heard about TCC technology from
    a. (1) ___Nurses from other units who have used a TCC technology
    b. (2) ___Nurses from other units who have not used TCC
    c. (3) ___Both number 1 and 2
    d. (4) ___Physicians
    e. (5)___unit managers or administrators
    f. (6) ___Internet
    g. (7) ___Television
    h. (8) other _____
11) Have you ever attended a conference on TCC technology (1) ___Yes (2) ___No 10)
    a. If "Yes", how many times did you attend conferences? _____
12) Number of years you have worked with any kind of computer _____
13) Do you have user support personnel available to help you with any computer problems? (a) _____Yes (b) ____No
14) How much support do you think you would have from your administrative team when TCC is implemented? Please rate the score form 1-10 (1 is no support and 10 is the most support) _____
15) How much support do you think you would have from Physicians when TCC is implemented? Please rate the score form 1-10 (1 is no support and 10 is the most support) _____

Please write any additional comments that you think about the TCC system:

THANK YOU SO MUCH!!!!

Richmond Medical Center ICU

Tele-Critical Care (TCC) Post-Implementation Survey

(*modified with permission from Kowitlawakul's "eICU® Acceptance Survey (EAS)"

Thank you for participating in this voluntary survey. All data collected in this survey is anonymous and will not be reported on an individual basis.

This survey consists of 3 sections. Please complete all questions.

Section I: Perceived Usefulness (PU)

Direction: The following statements refer to whether TCC technology can enhance patient care. Please read each statement carefully, and then circle only one answer for each statement. 1= Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree

Items	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
26. Using TCC technology enables me to accomplish tasks more quickly.	1	2	3	4	5
27. Using TCC technology improves my job performance.	1	2	3	4	5
28. Using TCC technology in my job increases my productivity.	1	2	3	4	5
29. Using TCC technology enhances my effectiveness on the job.	1	2	3	4	5
30. Using TCC technology makes it easier to do my job.	1	2	3	4	5
31. I find TCC technology useful in my job.	1	2	3	4	5
32. Using TCC technology improves communication in my job.	1	2	3	4	5

Please write your thoughts about TCC and your perceived usefulness of TCC in your ICU:

Section 2: Nurses' Attitudes toward TCC

Direction: The following statements refer to your attitude toward TCC. Please read each statement carefully, and then circle only one answer for each statement. 1= Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree

Items	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
33. The use of TCC technology improves patient care by giving the nurse more time with the patients.	1	2	3	4	5
34. TCC technology can be adapted to assist nurses in many aspects of patient care.	1	2	3	4	5
35. TCC data system offers nurses a remarkable opportunity to improve patient care.	1	2	3	4	5
36. TCC technology represents a violation of patient privacy.	1	2	3	4	5
37. TCC technology causes nurses to give less time to quality patient care.	1	2	3	4	5
38. TCC technology increases costs by increasing the nurse's workload.	1	2	3	4	5

39. TCC technology creates more problems than they solve in nursing practice.	1	2	3	4	5
40. The use of TCC technology dehumanizes nursing care.	1	2	3	4	5
41. Part of the increase in costs of health care is because of TCC technology.	1	2	3	4	5
42. Confidentiality will not be sacrificed by TCC technology.	1	2	3	4	5
43. I am comfortable using TCC technology.	1	2	3	4	5
44. Working with TCC technology makes me very nervous.	1	2	3	4	5
45. I feel threatened when others talk about TCC.	1	2	3	4	5
46. TCC technology does not scare me at all.	1	2	3	4	5
47. I feel hostile toward TCC.	1	2	3	4	5
48. TCC technology makes me feel uneasy and confused.	1	2	3	4	5
49. I have a lot of self-confidence when it comes to working with TCC technology.	1	2	3	4	5
50. TCC technology makes nurses' job easier.	1	2	3	4	5

Please write your thoughts about how you feel TCC will impact the care that you provide to your patients:

Section III: Demographic Data

Direction: Please fill out each item and select the item that best describe you.

16) Age: (1)_____ 20-30 (2) _____ 31-40 (3) _____ 41-50 (4) _____51-60 (5) _____ 61-70
17) What shift are you working? (1) ____ day shift (2)_____ pm shift (3) ____night shift
18) Sex: (1)____ Male (2) _____Female
19) Years worked as a nurse? _____
20) Job Title? _____
21) Educational Level: Check highest degree obtained
    a. (1)_____ Diploma
    b. (2) _____ Associate Degree
    c. (4) _____BSN
    d. (5) _____ MSN
    e. (6) _____ Ph.D
    f. (7) _____other (please describe)_____
22) How many years have you worked in this hospital? _____
23) How many years have you worked in critical care unit (ICU)? _____
24) How long have you heard about TCC? _____
25) I have heard about TCC technology from
    a. (1) ___Nurses from other units who have used a TCC technology
    b. (2) ___Nurses from other units who have not used TCC
    c. (3) ___Both number 1 and 2
    d. (4) ___Physicians
    e. (5)___unit managers or administrators
    f. (6) ___Internet
    g. (7) ___Television
    h. (8) other _____
26) Have you ever attended a conference on TCC technology (1) ___Yes (2) ___No 10)
    a. If "Yes", how many times did you attend conferences? __
27) Number of years you have worked with any kind of computer _____
28) Do you have user support personnel available to help you with any computer problems? (a) _____Yes (b) ____No
29) How much support do you think you would have from your administrative team when TCC is implemented? Please rate the score form 1-10 (1 is no support and 10 is the most support) _____
30) How much support do you think you would have from Physicians when TCC is implemented? Please rate the score form 1-10 (1 is no support and 10 is the most support) _____

Please write any additional comments that you think about the TCC system

THANK YOU SO MUCH!!!!

Tele Critical Care (TCC) Qualitative Survey

Pre-Survey

Demographics

1. Role: Nurse Manager | ANM | Other: _____
2. Number of years in current role:
3. Shift currently working: Day Evening Night
4. Have you heard of Tele Critical Care? Yes No

How much do you agree or disagree with the following statements?

*In this survey, **night** is defined as 8:00pm-8:00am.*

Nighttime availability of critical care expertise in your ICU

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. All the necessary information for diagnostic and therapeutic decisions is routinely available for me **at night**					
2. In matters pertaining to patient care, I have access to expert consultations in the ICU **at night**					

Timing of care provided in your ICU

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
3. When a patient's status changes, I get timely information regarding the change **at night**					
4. Patients/families are able to interact with clinical staff 24/7					
5. If a new order is needed for patient care, it can be reliably obtained in a timely manner **at night**					

Safety Climate in your ICU

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
6. I would feel safe being treated as a patient at Kaiser Permanente					
7. I think new technology will improve my ability to provide high quality care					
8. There is sufficient RN clinical rounding on patients in this ICU **at night**					
9. There is sufficient MD clinical rounding on patients in this ICU **at night**					

Quality Outcomes in your ICU

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
10. Given the acuity of the patients we treat, our unit's patients/families experience high quality care and outcomes (ex: prevention of hospital acquired infections, mortality, care provided aligns with patient goals, vent management, etc.)					

Communication in your ICU

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
11. Communication between nurses in this unit is very open					
12. Communication between nurses and physicians in this unit is very open					
13. Communication between nurses and respiratory therapists in this unit is very effective					

14. Communication between physicians and respiratory therapists in this unit is very effective					

Role of Technology in your ICU

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
15. Our unit does a good job of applying the most recently available technology to patient care needs					
16. I think new technology will diminish independence in my clinical practice					
17. I would use new technology in the ICU once it is available to me					
18. I feel as though staff in this ICU would benefit from an added layer of support at night					
19. If the added layer of support came in the form of technology, I feel as though staff would utilize it					

Nurse Manager-only section: (modify above questions)

If you have a question about the following clinical scenarios, how easy is it for your staff to obtain physician support in a timely manner **at night**?

	Very Easy	Somewhat Easy	Neutral	Somewhat Difficult	Very Difficult
20. Decision to intubate/prevention of intubation at night					
21. Ventilator management/ARDS at night					
22. Pain & Sedation Initiation/Management at night					
23. Ordering antibiotics at night					
24. Management of hemodynamics: initiation of vasoactive mediations at night					

25. Management of hemodynamics: fluid management at night					
26. Complicated sepsis management at night					

Appendix D. Statement of Non-Research Determination

CNL Project: Statement of Non-Research Determination Form

Student Name: Jeffrey Dover

Title of Proiect:

Tele Critical Care Implementation and Education Project

Brief Description of Proiect:

A) Aim Statement:

The AIM of this project will be to increase ICU RNs' perceived usefulness and perceived ease of use of Tele Critical Care (TCC) Technology by 15% in each category in post-intervention survey as compared to pre-intervention values through use of a TCC education module and to reach 80% staff attendance to this module. This will be projected to take place from April 20, 2020 through June l, 2020, allowing two weeks each for pre and post surveys and three weeks for staff education.

B) Description of Intervention:

Critical Care RNs at the target facility will be surveyed to determine baseline data on the perceived usefulness (PU) and perceived ease of use (PEOU) of the Tele Critical Care Technology. An educational module involving a live class will be administered to the staff outlining the technology, the benefits to patient care and allow opportunities for staff to ask questions and express any concerns regarding the new technology. A post-intervention survey will be given to staff and data will be examined to determine if the educational module had any effect on nurses' perceptions.

C) How will this intervention change practice?

By involving staff in the implementation process through education and staff input it is anticipated that TCC can be utilized more effectively, supporting evidence-based practice in the ICU and improve patient care in this setting.

D) Outcome measurements:

The pre and post surveys are adapted with author's permission from a validated survey titled "eICU Acceptance Survey" Measures from these data will center on RNs' PEOU and PU of TTC technology. An additional measure would involve the number of staff attending the educational module.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used: (http://answers.hhs.gov/ohrp/categories/1569)

X This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

D This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST *

Instructions: Answer YES or NO to each of the following statements:

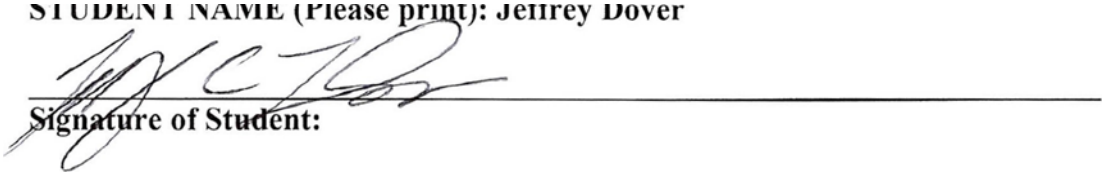
Project Title: TCC Implementation and Education	YES	NO
The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	X	
The specific aim is to improve performance on a specific service or program and is a part of usual care. ALL participants will receive standard of care.	X	
The project is NOT designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does NOT follow a protocol that overrides clinical decision-making.	X	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does NOT develop paradigms or untested methods or new untested standards.	X	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does NOT seek to test an Intervention that is beyond current science and experience.	X	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	X	
The project has NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	X	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	X	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: "This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.	X	

ANSWER KEY: If the answer to ALL of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. IRB

review is not required. Keep a copy of this checklist in your files. If the answer to ANY of these questions is NO, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

STUDENT NAME (Please print): Jeffrey Dover



Signature of Student:

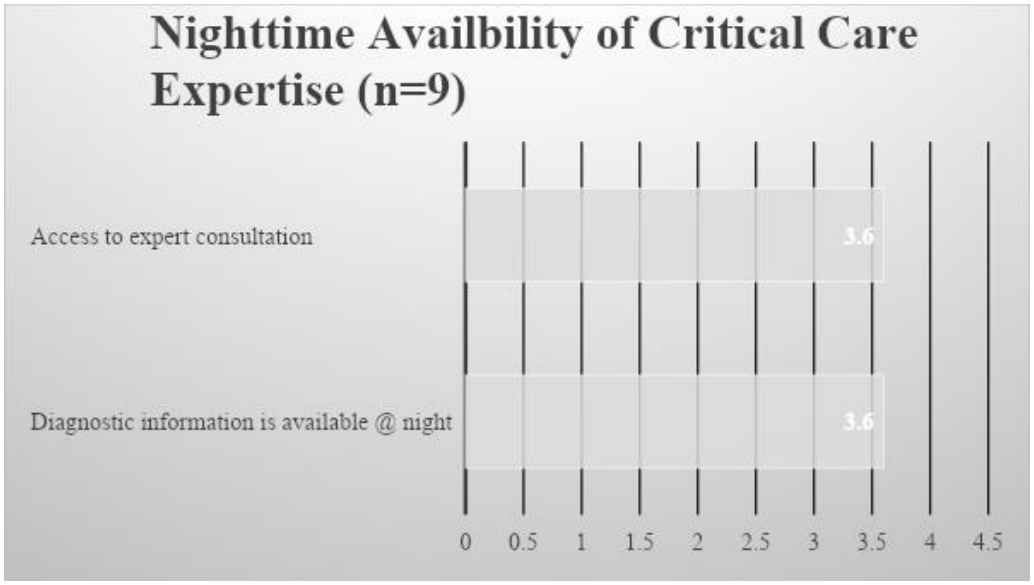
Jeffrey C. Dover BSN, RN, CCRN DATE 4/11/20

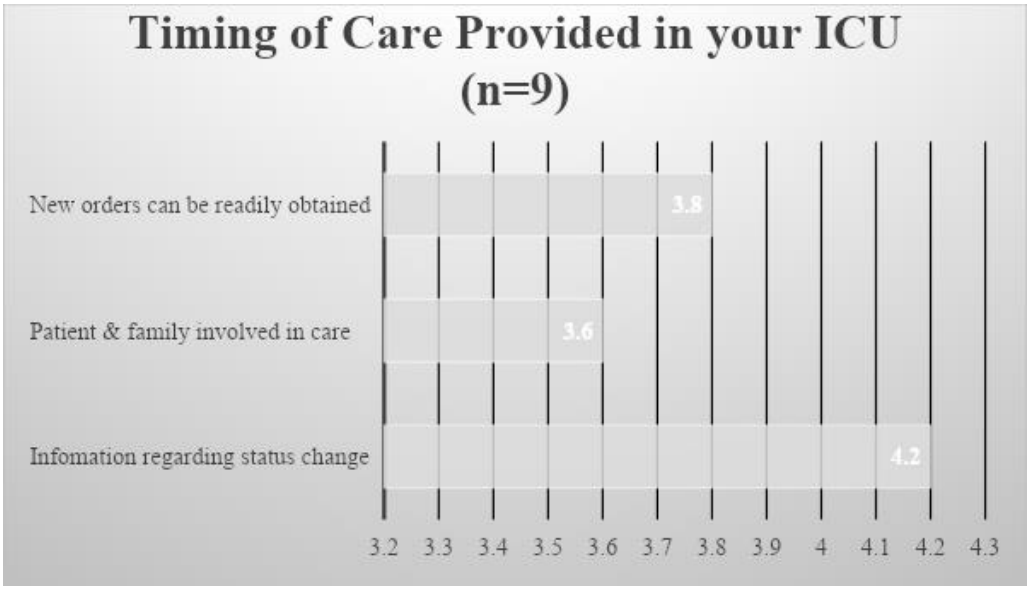
SUPERVISING FACULTY MEMBER NAME (Please print): Liesel Buchner

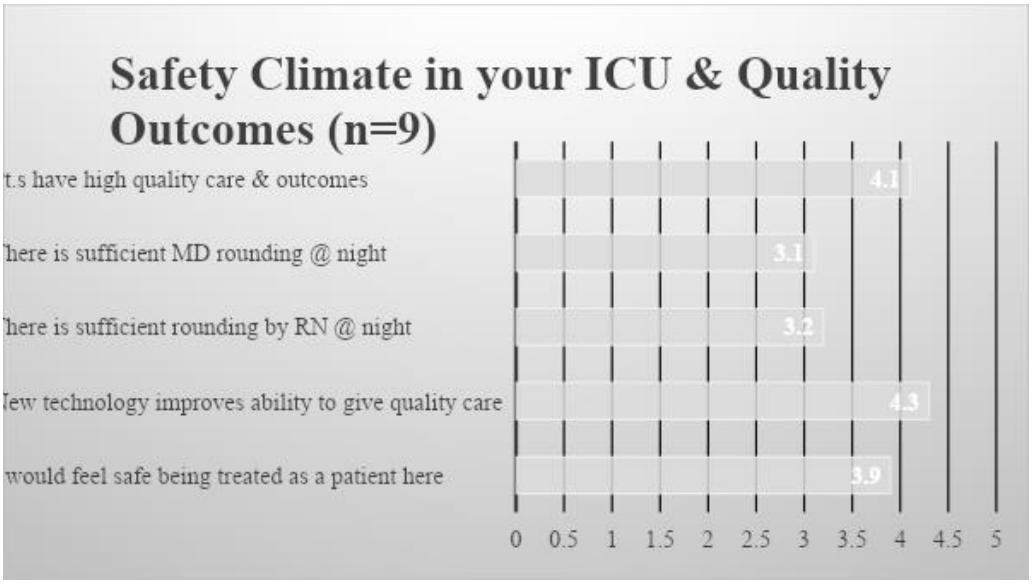
Signature of Supervising Faculty Member

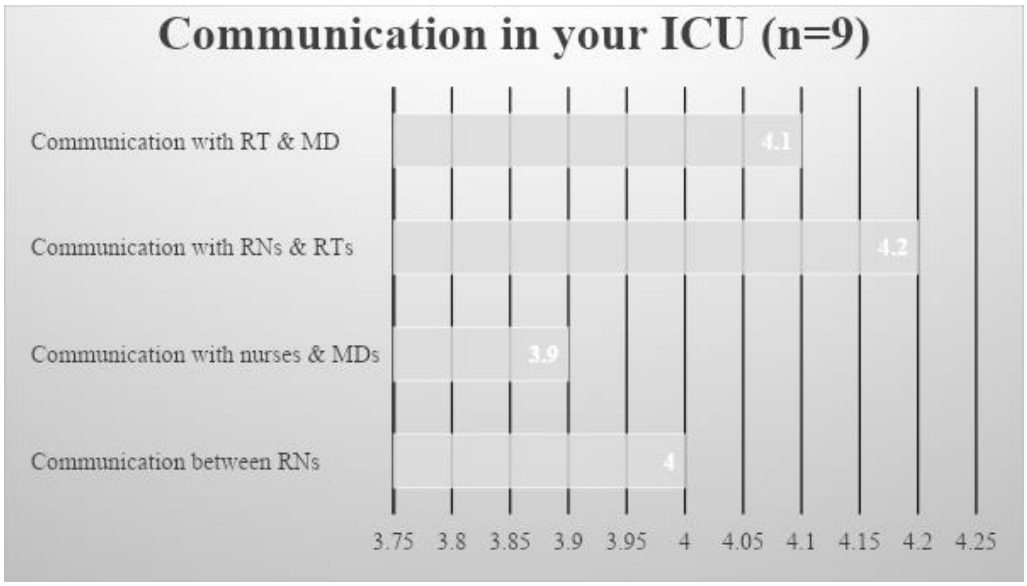
DATE

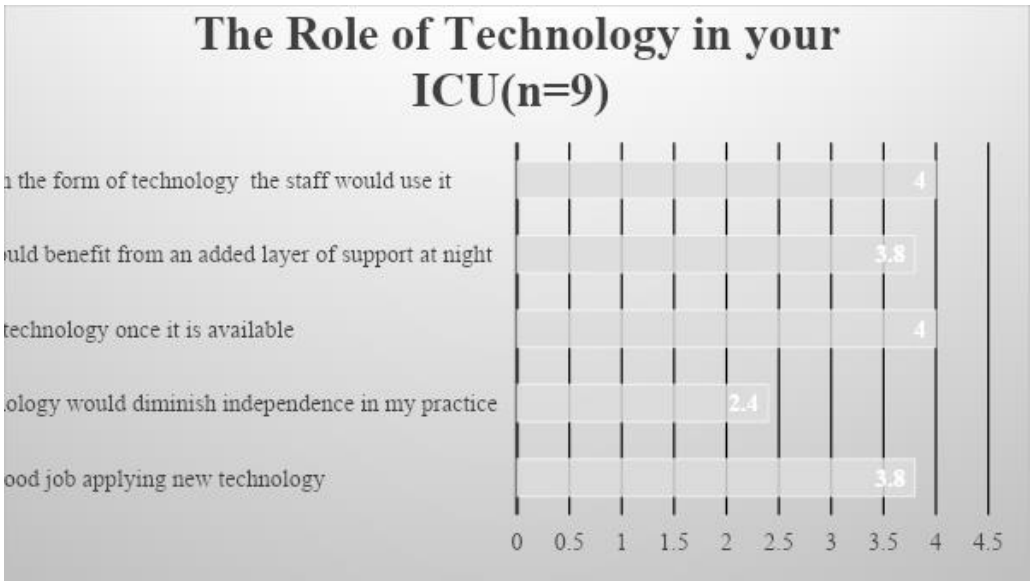
Appendix E. Survey Results Graphs

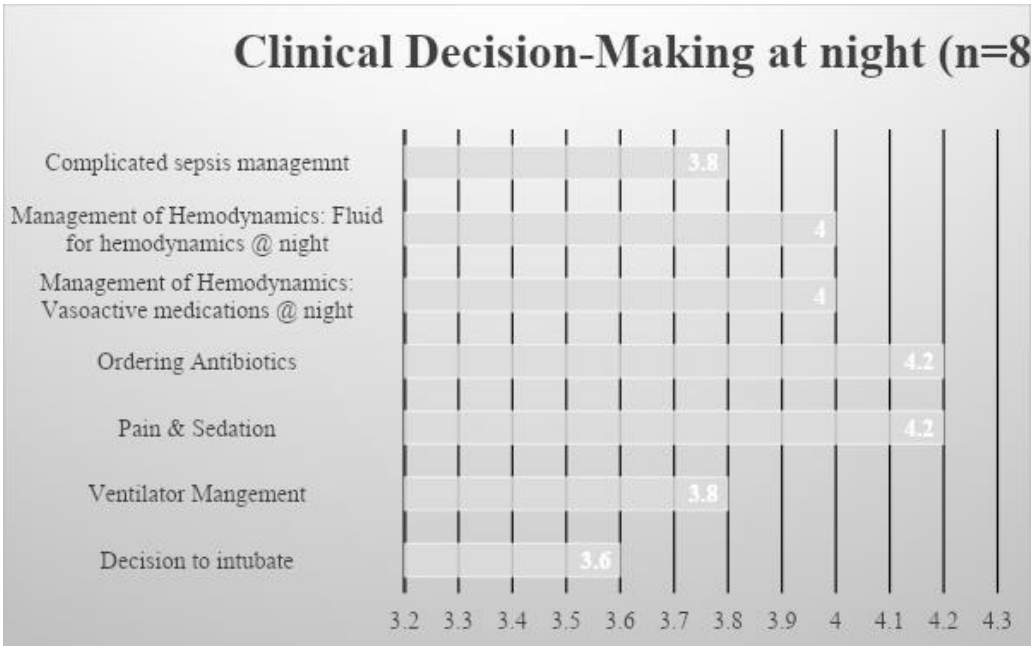





Safety Climate in your ICU & Quality Outcomes (n=9)
t.s have high quality care & outcomes
here is sufficient MD rounding @ night
here is sufficient rounding by RN @ night
ew technology improves ability to give quality care
would feel safe being treated as a patient here
4.1
3.1
3.2
4.3
3.9
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5


Communication in your ICU (n=9)
Communication with RT & MD
Communication with RNs & RTs
Communication with nurses & MDs
Communication between RNs
4.1
4.2
3.9
4
3.75 3.8 3.85 3.9 3.95 4 4.05 4.1 4.15 4.2 4.25


The Role of Technology in your ICU(n=9)
n the form of technology the staff would use it
uld benefit from an added layer of support at night
technology once it is available
ology would diminish independence in my practice
ood job applying new technology
4
3.8
4
2.4
3.8
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5


Clinical Decision-Making at night (n=8
Complicated sepsis managemnt
Management of Hemodynamics: Fluid for hemodynamics @ night
Management of Hemodynamics: Vasoactive medications @ night
Ordering Antibiotics
Pain & Sedation
Ventilator Mangement
Decision to intubate
3.8
4
4
4.2
4.2
3.8
3.6
3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4 4.1 4.2 4.3

Appendix F. Budget Proposal

Budget Proposal TCC Implementation & Education Project

Assumptions:

Number of staff to be trained:	50 RNs
Estimated Paid Time per Employee:	30 minutes
Estimated hourly pay per RN:	$80/ hr.
Minimum total cost @ straight time:	$2,000
(50 x .5 = 25 hrs. x $80)	
Maximum estimated cost @ 1.5x:	$3,000
Overtime (25 hrs. x $120)	
Additional expenses:	
Printed copies/ Handouts	$50
Total estimated budget:	**$2050-$3050**

Appendix G. Project Charter

Project Charter: Tele Critical Care Implementation and Education Project

Global Aim: To facilitate implementation of Tele Critical Care technology at Kaiser Richmond Medical Center ICU and thereby support evidence-based practice in the ICU, improving patient care.

Specific Aim: The AIM of this project will be to increase the RNs' perceived usefulness and perceived ease of use of TCC technology through providing an educational module giving information on the development of the technology, the anticipated benefits of the use of this technology in improvement in patient care and providing opportunities for staff to ask questions or voice concerns about the implementation.

Background: The challenge of providing care in the ICU setting is daunting. Here is found the most profoundly ill patients in the hospital, with a mortality rate of up to 20% (The Network for Excellence in Health Innovation [NEHI], 2011). ICUs face two dynamics: an aging population, increasing the number and acuity of critically ill patients admitted and an aging healthcare workforce. This will translate in many providers leaving the workforce. As many as one million nurses are estimated to retire in the next ten years. (Buerhaus, Skinner, Auerbach, & Staige, 2017).

To address a shrinking and less experienced workforce and an increasing regulatory burden to meet evidence-based goals, many organizations have turned to intensive care telemedicine to augment and enhance care in the ICU. There have been challenges described to successful implementation have included staff acceptance, issues involving autonomy and patient privacy (Canfield & Galvin, 2018). However, tailored pre-implementation strategies such as clinical

support and education have been noted as factors to successful implementation of ICU telemedicine projects (Bagot et al., 2020).

Kaiser Permanente is planning to implement an ICU telemedicine platform in each of its 21 Norther California medical centers. Richmond Medical Center is slated to be one of the next hospitals to receive TCC. As part of this effort, this project is planned to educate the RN staff regarding the TCC technology and benefits in order to provide support to the ICU staff and to better facilitate the TCC initiative and its goal of improved patient care in the ICU.

Sponsors

Adult Services Director

ICU Manager

TCC Director

Goals

To provide clinical education and support to ICU staff nurses in anticipation of Tele Critical Care project implementation. Now projected to take place between October and December 2020. This will be achieved through administering a pre survey to involved staff to determine attitudes toward the new technology in terms of perceived usefulness and ease of use. An educational activity will take place to provide information regarding the new technology. A post survey will be administered to determine the effect of education on staff attitudes toward TCC.

Measures

Measure	Data Source	Target
Outcome		
Staff RNs' perceived ease of use Staff RNs' perceived usefulness	TCC Implementation Survey	+15% from baseline +15% from baseline
Process		
% Staff response to surveys (pre & post)	From Survey data analysis	75%
% Staff attendance of TCC education module	Employee sign-in roster	80%
Balancing		
Limit related overtime to budgeted level	Timekeeping report	Within budget (est. 15-30 minutes per employee)

Team

ICU Manager

Assistant Nurse Manager

Nurse Educator

RN Champions

References

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Appendix A

Measurement Strategy

Background (Global Aim)

The Global Aim of this project will be to increase adherence to evidence-based care standards in the intensive care setting through the addition of an intensive care telemedicine platform (TCC). This is anticipated to manifest in improvement in patient care as evidenced by decreased ICU mortality and morbidity, decreased length of stay in the ICU and improved financial performance.

Population Criteria

The target population for this project are registered nurses who are regular employees of Kaiser Permanente and work primarily in the Intensive Care Unit at Kaiser Richmond Medical Center.

Data Collection Method

A survey based upon the Technology Acceptance Model will be administered to ICU RNs in the target unit pre and post intervention. This survey consists of 25 questions on a scale ranging from 1(strongly disagree) to 5 (strongly agree). This survey is in three sections: Perceived Usefulness (questions 1-7) and Nurses' Attitudes toward TCC (questions 8-25) Each section will have an area for staff comments and the final section will collect respondent demographic data regarding level of education, and years of experience.

Data Definitions

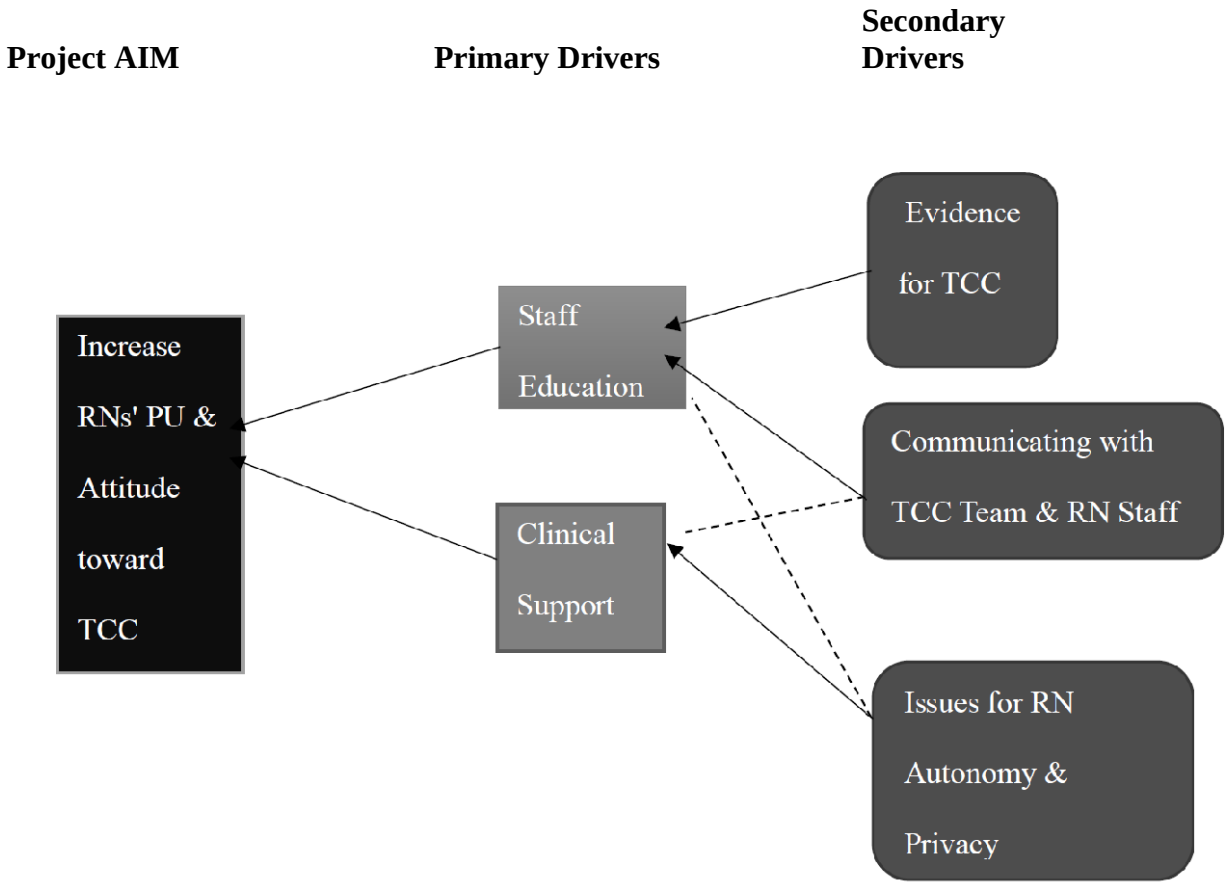
Data Element	Definition
Pre-implementation Survey	Validated tool evaluating staff perceptions of TCC's PU and PEOU prior to education.
Education Module	A unit specific educational activity outlining development of ICU TM, TCC EBP, clinical interface with TCC team and staff Q&A regarding new system.
Post-implementation survey	Validated tool evaluating staff perceptions of PU and PEOU of TCC optimally following TCC education.
ICU RN	A registered nurse employed by Kaiser Permanente, who regularly works in the ICU at KFH Richmond. This excludes traveling RNs or other temporary staff members.

Measure Description

Measure	Measure Definition	Data Collection Source	Goal
Perceived Usefulness	**THE DEGREE TO WHICH A PERSON BELIEVES THAT USING A SYSTEM WOULD ENHANCE HIS OR HER JOB PERFORMANCE**	TCC implementation Survey	75% response rate with a 15% increase as seen in the Post-implementation survey
Attitudes toward TCC	**THE DEGREE TO WHICH A PERSON HOLDS A POSITIVE VIEW OF TCC TECHNOLOGY**	TCC implementation Survey	75% response rate with a 15% increase as seen in the Post-implementation survey
% Staff attendance of TCC education module	**NUMBER OF ICU STAFF NURSES ATTENDING EDUCATIONAL EVENT**	Sign-in sheet	80% attendance to educational event

Appendix B:

Driver Diagram



Appendix C:

Top Three CNL Competencies Supported

1. **Clinical educator:** Supporting learning and understanding of TCC technology.
2. **Team leader/ communicator**: Coordinating communication between Richmond leadership team, the clinical staff and TTC team to facilitate TCC implementation.
3. **Information Manager:** Advocating for and supporting use of new and innovative technology to provide better care to patients in the intensive care setting.