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Effects of Telemedicine in the Intensive Care Unit on Quality of Care

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2015

Abstract

Effects of Telemedicine in the Intensive Care Unit on Quality of Care

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Amanda J. Wallace

MSN, Walden University, 2013

Project Submitted in Partial Fulfillment

Of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

October 2015

Abstract

The growing concern over the nursing shortage has affected the intensive care unit (ICU) and how these units provide quality care, adhere to best practices, and maintain high satisfaction scores. Implementing telemedicine technology allows the ICU to have additional staff available, via cameras at an offsite location, to assist with patient care. The purpose of this project was to evaluate the potential benefits of telemedicine application used within an ICU on quality of care, adherence to best practices, and satisfaction, as evidenced by data from the hospital's telemedicine dashboard. The goals of this project were to reduce length of stay, increase staff satisfaction, and increase compliance with best practices. The diffusion of innovation theory was used to bring about successful change among team members in the ICU. The Focus Plan, Do, Study, Act methodology was used to determine what improvements were needed in the ICU. The evaluation of the telemedicine unit demonstrated early signs of positive progress. Actual length of stay (3.25 days) from the hospital's telemedicine dashboard was less than the predicted length of stay (3.8 days), and adherence to best practice was at or above target (95%) when compared to all telemedicine units across the nation, as provided by the telemedicine dashboard. Implementing a telemedicine unit will bring about a transparency and standardization of Intensive Care services, leading to positive social change in the organization. This social change, combined with the success of the unit, can influence other non-academic healthcare institutions to pursue telemedicine technology.

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Dedication

I dedicate this project to my grandfather, Carl, who passed away in late 2009, shortly after I finished my ADN program. He was always so proud of me, but wasn't able to see me pass my RN boards, finish my Master's degree or this degree. I know that he watches over me and is always beside me as I start new journeys, especially this one. I hope I've made you proud Grandpa.

I also dedicate this to my father-in-law, Paul, who passed away unexpectedly from Creutzfeldt - Jakob disease near the end of my program. He was anxiously waiting for me to graduate, so he could brag about having a "Doctor" in the family. Well, Paul brag away, I know you have plenty of ears where you are.

I also dedicate this project to a dear nursing friend of mine, Cindy. She passed away suddenly as I began writing my proposal. She and I spent a lot of time together when I was working evenings as a charge nurse. She was a wonderful nurse who passed well before her time. I hope that she knows how much I will miss her and how much she means to me, as a nurse and a friend.

To my instructors and mentors, Dr. Marisa Wilson and Dr. Murielle Beene, I would not have survived this journey without your guidance, comments, and support. Thank you for all you have done and all you continue to do. I will be forever grateful.

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Section 1: Nature of the Telemedicine (eCare) Unit

Introduction

Hospital admissions can have multiple phases of care ranging from observation to critical care. As part of the critical care phase, that patient is monitored in a busy intensive care unit (ICU). The ICU is a higher acuity environment requiring closer monitoring by clinicians. Unfortunately, many hospitals are finding it difficult to staff their ICUs with clinicians, due to a shortage (Thomas, Lucke, Wueste, Weavind, & Patel, 2009). That shortage is leading healthcare organizations to look for alternatives and extensions of physician and nurse coverage, such as eCare.

Telemedicine in the ICU setting has been called many things since its inception. One of the most recognizable names is eICU®, which is the trademarked name given by the Phillips Corporation. Telemedicine is a technology that allows healthcare professionals the ability to view patients, through two way cameras, from a remote location. The hospital system documented in this proposal chose the name eCare for their telemedicine project. For the purpose of this paper, any and all references to telemedicine, or eICU®, will be called eCare.

The use of eCare is a promising technological approach designed to systematically change the processes of care that affect the outcomes of that care (Lilly, Cody, Zhao Landry, Baker, McIlwaine, Chandler, & Irwin, 2011). The growth of eCare is based on several phenomena occurring in the ICU environment. There is a movement to improve outcomes, decrease length of stay (LOS) and increase staff and patient satisfaction.

The use of eCare is not a new concept, as this mode of care delivery has been in existence for over 25 years and has evolved into a vital tool for hospitals and physicians to improve quality and efficiency of care provided in ICUs (Kahn, 2011). The use of eCare technology has been referred to, by some, as a "second set of eyes" to provide additional clinical surveillance and support (Goran, 2010, p. 47). In this project, I examine the correlation between eCare technology and positive change in patient outcomes, such as: (a) LOS, (b) satisfaction, and (c) best practices.

Problem Statement

The problem addressed in this project was the growing concern over the shortage of qualified clinicians in the ICU and the potential effect it has on: (a) quality of care, (b) adherence to best practices, and (c) patient and staff satisfaction. The rationale for implementation of eCare technology was promulgated by the question: Does the use of eCare technology, as an extension of clinician coverage, reduce LOS and increase patient and nursing satisfaction and improve patient outcomes through adherence to best practices? The organization looked at implementing eCare technology for many reasons, including, but not limited to: (a) improved utilization of resources, (b) to improve outcomes based on what other facilities with eCare technology have seen, and (c) to standardize care throughout the 12 hospital organization (personal communication, T. Akerman, November 28th, 2014).

This technology enables hospitals to have real-time access to physicians and registered nurses, trained in critical care, via cameras and computerized documentation (Taylor, 2013). With the use of this technology, patients are assessed and treated more

efficiently. Using eCare technology, the physician is immediately available and can easily see and hear what is going on with the patient. The clinicians that work in the eCare unit are located at a remote location, typically off campus from the hospital, yet, readily accessible by camera or phone. For this organization, the location, or bunker, was located in an outpatient/office center. Following implementation of eCare in rural hospitals located in the Midwest, a significant decrease in ICU LOS and temporary physician coverage expense was reported (Health Management Technology, 2007; Taylor, 2013).

Purpose Statement

The purpose of this project was to examine the relationship between the implementation of eCare technology and its effect on: (a) LOS, (b) patient and staff satisfaction, and (c) best practices. Organizations rely on positive satisfaction scores and best practice outcomes for benchmarking and opportunities for improvement in patient care. The organization's managers are provided with or have access to quarterly data surrounding satisfaction scores and key performance indicators as measures of best practices. This allows the managers to see where there are opportunities for improvement.

Project Goals and Objectives

The project looked at the features and proposed benefits of implementing an eCare technology unit. These proposed benefits to the organization and clinicians helped increase the quality and efficiency of care, reduce complications, and decrease LOS. The eCare technology was used as a facilitator of change management as much as it could be used as an intervention (Ries, 2014). According to Phillips Corporation (2014), some of

the benefits of an eCare program include: (a) reduction in LOS, (b) decline in nursing staff turnover, (c) improved throughput, (d) decrease in adverse outcomes, (e) decrease in frequency of complications, and (f) increase in compliance with best practices. The organization anticipated the following outcomes: (a) reduction in ICU LOS by 10%, (b) increase in staff satisfaction by 15%, as measured by Team Member as Customer Survey, and (c) increased compliance with best practices, as measured by a decrease in complications and LOS by 15%.

Significance of the Project

As technology continues to change, so does Nursing. In order to stay current with the practice of Nursing, new and better tools are developed to maintain and/or increase patient safety, health and experience. The development of eCare is one such tool. Successful implementation of an eCare unit can provide organizations with: (a) reduction in LOS, (b) decline in nursing staff turnover, (c) improved throughput, (d) decrease in adverse outcomes, © decrease in frequency of complications, and (f) increase in compliance in best practices (Lilly, et al. 2011; Lilly, McLaughlin, Zhao, Baker, Cody, & Irwin, 2014; Phillips, 2014).

Currently, there are over 45 eCare programs in the United States. These programs cover over 200 hospitals and are providing care to approximately 10% of all critically ill patients that are admitted to the hospital (Goran, 2012). As with the nature of nursing and healthcare, this number is expected to grow as demand increases.

Hospitals that have implemented eCare units supporting best practices have seen a decrease in complications (Kahn, 2011). Lilly et al. (2011) conducted a study following

implementation of an eCare unit which found: (a) shorter hospital and ICU LOS, (b) significantly higher adherence to critical care best practices, (c) lower rates of complications, and (d) more rapid response to alerts to physiological instability. Higher level of adherence to ICU best practices and quick response times to alerts and alarms, following implementation of eCare, is being associated with better and more improved patient outcomes (Lilly et al. 2014).

Implications for Social Change in Practice

Choosing to implement an eCare unit was thought to bring about a transparency and standardization of Intensive Care services in the organization. Along with standardization, there was unity between teams and collaboration of care that resulted in the increase in patient satisfaction and the improvement in patient outcomes. The success of this unit can be used to influence other non-academic healthcare institutions to pursue eCare technology as a part of their intensive care services.

Implementing a successful eCare unit requires: (a) detailed needs assessment, (b) complete assessment of barriers to practice change, (c) prioritization of specific projects, and (d) introduction of effective strategies for improvement and measuring results in a stepwise fashion (Kahn, 2011). Once these measures are in place and the unit is successful, the organization will use the data to inform the addition of eCare to the remaining five hospitals in the system.

Definition of Terms

The following terms and definitions were used to guide this proposed project.

Bedside clinicians: Referred to as the floor ICU staff. This consists of, but is not limited to, registered nurses (RN), certified nursing assistants (CNA), patient care technician (PCT), physician, physician assistant, and advanced registered nurse practitioner (Hospital System, 2014).

Clinicians: Clinicians are defined as any licensed professional cares for patients in the ICU setting. This can include, but is not limited to, RN, physicians, physician assistants, and nurse practitioners (Study Sites, 2014).

eCare: eCare is the term that was developed by the Hospital system to name the telemedicine technology that will be implemented in their hospitals (Hospital System, 2014).

Glycemic control: Average daily glucose values for all patients using a time-weighted average versus a standard average to show better control instead of instability (Phillips, 2014).

Intensive Care Unit (ICU): A hospital unit where special equipment and specially trained personnel care for seriously ill patients requiring immediate and continuous attention (MedicineNet.com, n.d.).

Length of stay (LOS): Referred to as the duration of a single hospital admission stay (Healthcare Cost and Utilization Project, 2009).

Patient satisfaction: Used as a determinant for quality of care, as well as reimbursement for certain services. Data involving patient satisfaction is acquired through post-discharge survey (Center for Medicare and Medicaid Services, n.d.).

Staff satisfaction: Used as a determinant for retention and engagement of staff. Data involving staff satisfaction is acquired through the Team Member as Customer survey that is administered biannually (Hospital System, 2014).

Stress ulcer prophylaxis: Defined as the use of medications to reduce the risk of acquiring a peptic ulcer during stay in the ICU. The medications will be used for at risk patients, such as: (a) those ventilated greater than 24 hours, (b) head injuries, (c) burns, or (d) coagulopathies (Phillips, 2014).

Telemedicine: Using medical information that is exchanged from one site to another via electronic communication to improve patient conditions (Goran, 2010).

Venous thromboembolism (VTE) Prophylaxis: Prophylactic therapies, mechanical or pharmacological, used for all patients with an ICU stay greater than 24 hours (Phillips, 2014).

Assumptions

Assumptions can be defined as statements that are considered true, even when they have not been scientifically tested or proven (Grove, Burns, & Gray, 2013). The project included the following assumptions: (a) the eCare RNs and ICU RNs will cooperate together as a collaborative, (b) the eCare Clinicians and ICU Clinicians will cooperate together as a collaborative, (c) the eCare team will assume care of the patient, in collaboration with the ICU, anytime the camera is turned on, (d) the eCare Physicians will have full discretion over all patients monitored in the eCare unit, with exception of admission orders. Admission orders can only be written by the physician if they are a

practicing member of that hospital, and (e) clinician hand-off report will be conducted the same as it is on the ICU unit to keep with consistency of care.

Limitations

Limitations can be defined as weaknesses or restrictions that may influence or decrease the findings of a study (Grove, Burns, & Gray, 2013). The project included the following limitations: (a) this eCare implementation project was designed specifically for this hospital system and may not work elsewhere, (b) all eCare clinicians have order writing privileges among all of the hospitals in the system for established patients. Clinicians were not allowed to write admission orders for patients being admitted to the ICU at a hospital where the clinician is not a practicing member, (c) currently, all RNs are licensed by the state of Florida and have at least five years of critical care experience. They were required to obtain their Critical Care Registered Nurse (CCRN) certification within 18 months of hire into the eCare setting, and (d) the first 6 months of results are deemed *non-usable* by the hospital system as those 6 months are spent working on establishing the unit.

Summary

In this chapter, I provided an overview of what eCare is and how this technology will affect patient care outcomes. Proper implementation resulted in data to be analyzed and outcome reports which may lead to the expansion of the eCare unit across the entire hospital system, which totaled 10 hospitals.

Section two focuses on a review of the literature along with the theoretical framework that will support the project. The literature will address: (a) patient and staff satisfaction, (b) LOS, and (c) adherence to best practices.

Section 2: Review of Scholarly Evidence

Introduction

The purpose of this project was to look at quality improvement initiatives and examine the relationship between the implementation of eCare technology and its effect on: (a) LOS, (b) patient and staff satisfaction, and (c) adherence to best practices. A literature review was conducted to provide background and justification of the outcomes being measured. In this section, I examined the scholarly literature as it related to: (a) patient and staff satisfaction, (b) LOS, and (c) adherence to best practices.

eCare Technology

Patient and Staff Satisfaction

I this project, I used patient and staff satisfaction scores to determine opportunities for improvement, as well as, praise for positive outcomes. In the ICU and eCare units, satisfaction rates can be attributed to successful communication and collaboration between healthcare staff (Goran, 2012; Goran & Mullen-Fortino, 2012; Romig, Latif, Gill, Pronovost, & Sapirstein, 2012). Keeping information transparent between the ICU and eCare unit is an important part of the plan of care (Goran & Mullen-Fortino, 2012).

Having open communication about the safety that is provided by the eCare unit offers patients and family a sense of security (Goran, 2012; Taylor, 2013). Family responses show an increased sense of comfort as well as a heightened sense of safety with the use of eCare technology (Goran, 2012). Patients and families tend to be more at ease when they are fully informed of their conditions and situations. According to Ahrens

and Walker (2007), having an understanding of the treatment plan and a clinician quickly available empowers the patient and greatly improves their comfort level (as cited in Yeo, Ahrens, & Wright, 2012). Communication about the eCare technology and the safety it provides to the patient brings families a sense of comfort (Taylor, 2013).

Job satisfaction and the motivation within that job are predictors of RN turnover, which means understanding what motivates eCare RNs can help to retain them in the eCare unit (Hoonakker, Carayon, McGuire, Khunlertkit, Wiegmann, Alyousef, Xie, & Wood, 2013). Romig et al. (2012) demonstrated a statistical significance in job satisfaction when questioned following implementation of an eCare unit. Increased staff satisfaction has also been linked to an improvement in the efficiency of care provided in the ICU and eCare units (Yeo, Ahrens, & Wright, 2012). Along with efficiency, nursing staff also view the eCare unit coverage as improving quality (Goran, 2012). The eCare unit has been seen by some nursing staff as a positive way of reducing physical and emotional stress and provides the opportunity to prolong the career of an experienced ICU RN (Goran, 2012). Implementing eCare units creates a new and interesting challenge for RNs, thus increasing their opportunity to learn and their job satisfactions (Hoonakker et al. 2013).

Length of Stay

Length of stay is a commonly measured indicator in most ICUs. An increase in LOS can influence many factors during a patient's admission. Many factors can affect a patients LOS in the ICU: (a) primary diagnosis, (b) use of mechanical ventilation, (c) provider ordering, (d) patient reaction to treatment plan, (e) bed availability on non-

critical care units, and (f) clinician availability to write, receive and carry out orders. With the use of eCare technology, many hospitals have been able to decrease their LOS in ICUs (Kohl, et al. 2012; Lilly, et al. 2011; Sadaka, Palagiri, Trottier, Deibert, Gudmestad, Sommer, & Veremakis, 2013; Wilcox & Adhikari, 2012).

One hospital in North Carolina, after implementing eCare, their LOS for ventilated patients went from 14.2 to 7.0 days (Taylor, 2013). In Missouri, following implementation of eCare, a 200-bed hospital decreased their ICU LOS by 6% and their overall hospital LOS for the ICU patient by 14% (Health Management Technology, 2007). Lilly et al., conducted a study with 119,000 adult patients from 56 ICUs located in 15 different states (2014). Of the 119,000 patients studied, 11,500 were control, 117,500 were in the eCare group. The eCare subjects showed a 20% shorter ICU LOS as compared to the control group (Lilly et al. 2014).

Similarly, a Massachusetts study demonstrated a decrease in LOS from 13.3 days to 9.8 days (Lilly et al. 2011). The addition of eCare units fosters faster communication between floor staff and eCare staff, which directly affects patient treatment and LOS. The ability to anticipate and prepare for complications before they occur or when they are just beginning, allows clinicians to offer efficient care for a better patient outcome. As healthcare continues to evolve with technology, more eCare units will be implemented across the United States, which will greatly increase patient outcomes, satisfaction and safety.

Adherence to Best Practices

The success of eCare units is based on meeting individual hospital outcomes, such as the improved compliance with best practice guidelines (Goran, 2010). Patients admitted to eCare units showed an increase in evidence based preventive strategies (Kahn, 2011). Implementing eCare has been shown to include a higher rate of ICU best practice adherence and a quicker response to alerts and alarms, leading to improved outcomes (Lilly et al. 2014). Lilly et al., conducted a study in which they showed a significantly higher rate of VTE prophylaxis and stress ulcer prophylaxis following implementation of eCare (2011). Phillips has published results of their successful eCare implementations showing a dramatic increase in best practice compliance, which has resulted in a major decrease in severity-adjusted mortality (2014).

Units using eCare technology can improve patient outcomes by improving clinician adherence to best practices in the ICU (Wilcox & Adhikari, 2012; Williams, Hubbard, Daye, & Barden, 2012). RNs working in eCare units have been able to use information technology tools available to them to advance evidence-based practice in large healthcare systems (Rincon, 2012). The eCare RNs can be responsible for VTE prophylaxis and stress ulcer prophylaxis best practice initiatives and their compliance (Williams et al. 2012). Williams et al. (2012) demonstrates how the eCare RN is to be used as an addition to the ICU team, not a replacement, to assist in improving processes and outcomes within the hospital system.

Theoretical Framework: Diffusion of Innovation

Changing the healthcare delivery model from the inpatient model to one of collaboration between inpatient and remote clinicians can pose some challenges. To guide the process of the new model, change theory will need to be adopted. The elements described in this theory will allow for change, acceptance, and confrontation, if necessary (Rufo, 2012).

Rogers' (1962) Diffusion of Innovation Theory provides a strong process that involves adoption of new practices or ideas over a period of time; focusing on key players first, then rolling out across the organization through steps (Boston University School of Public Health, 2013). For the eCare units at this hospital system, resource RNs were identified, or as Rogers defines them, innovators. They were responsible for receiving the training on the new equipment and policies first.

Following training, they assisted with the training of the remainder of the staff and also served as the *go to* for any questions or concerns during original project roll out. Any staff that did not complete the required training was held accountable by organization policy. This policy states that any staff member, who, knowingly refuses or fails to complete mandatory training is subject to disciplinary action and/or termination (Study Sites, 2014). These innovator RNs are highly qualified, trained and motivated. They have exhibited qualities that make them natural leaders, which assisted in making this project implementation successful. The project has: (a) innovators, (b) relevance to nursing practice and technology, (c) the ability to produce measurable results, and (d) is evidence based.

Summary

This literature focused on the following areas: (a) patient and staff satisfaction, (b) LOS, and (c) adherence to best practices. The diffusion of innovation theory was presented as the theoretical framework. The literature and theoretical framework provided a solid defense for the successful implementation and use of an eCare unit. Section 3 will include the project design to bring about the change and results needed to achieve the goals set forth in this quality improvement project. I created a Focus Plan, Do, Study, Act (PDSA) methodology, while the project evaluation will focus on Kurt Lewin's change theory (1947).

Section 3: Approach

Project Design Method

Focus Plan, Do, Study, Act (PDSA)

As part of the implementation of the eCare unit, I used a Focus PDSA

methodology to measure improvements needed. The hospitals system referred to use the

Focus PDSA model that was developed by Dr. W. Edwards Deming (Hospital System,

2014). The focus element in the Focus PDSA model refers to:

- F: Find a process that needs to be improved upon.

- O: Organize a team of individuals who should be on the quality improvement

  team.

- C: Clarify what the current process is.

- U: Understand and identify the variations in the current process.

- S: Select what improvements need to made to improve quality of care.

When using the Focus PDSA model, the organization was able to accurately

disseminate the areas where there is room for quality improvement and how this related

to the implementation of the eCare unit. The PDSA model is a continuous process and

if, during any point, the organization finds a new problem, they can begin the cycle

again with a new plan or variation of the original plan (American Society for Quality, n.

d.).

The eCare unit has the ability to monitor up to 140 patients at one time between

the 5 hospitals that will be live on this technology. Currently, there are 20 Nurses and 26

Physicians credentialed and employed in the eCare unit. In order to gain data regarding

the impact of eCare implementation, the organization provided patients and staff with a survey. The survey provided to patients was the already distributed post discharge survey. These were distributed by mail from a third party distributer. The results of the survey were anonymous, with exception of surveys that were received with free text comments. Surveys with free text comments were given an identifier number that upper administration used to determine the identity of the patient, if follow up communication with the patient was necessary. For the staff survey, an organization wide survey was distributed to all employees. Employees received an email with a link to an anonymous survey site to complete the survey. Individual results of the survey were not shared through the organization, only unit based data.

Project Evaluation Plan

Lewin (1947) presented the *Theory of Change* to aid the field of social psychology and many other disciplines (Connelly, 2014). Lewin's change theory addresses the approach needed to achieve change, making it a valuable tool for evaluating outcomes. In addition, this change is needed to adjust to new policies and politics associated with adding a new unit in conjunction with an established unit. The outcomes measured were: (a) LOS, (b) patient satisfaction, as evidenced by post-discharge survey, (c) staff satisfaction, as evidenced by the Team Member as Customer survey, and (d) best practice adherence.

All surveys were distributed anonymously and the results were provided to managers and directors anonymously. The only information shared with managers and directors was free text comments provided in the post discharge survey, which is used for

managers and directors if follow up was needed (personal communication, J. Lange, November 28th, 2014). Although Lewin's change theory examined modifying behaviors that bring about change to alter the outcomes, it is important to remember the data will be benchmark data that was brought up on the eCare dashboard quarterly and reviewed (Nursing Theories, 2011; Phillips, 2014).

When evaluating the short term, I looked at the eCare dashboard best practices data quarterly, with the first review of data 6 weeks following implementation. This data was provided using the Phillips Bed Manager Program. This program is unique to eCare and is able to provide data in multiple formats to the user. The next quarterly review provided solid data containing three full months of operational eCare outcomes. This information was provided through secondary analysis in the form of a dashboard report.

When evaluating the long term, I focused on the dashboard outcomes after 18 continuous operational months. This data helped to determine the expansion of the unit to the remaining five hospitals. In addition, the results of the patient and staff satisfaction surveys will be reviewed yearly to identify process improvement opportunities.

Summary

Improving patient outcomes and satisfaction are important quality indicators in nursing and healthcare. Implementation of eCare units, which are shown to improve best practices and satisfaction, are growing and are continually needed for positive development of healthcare and technology. In this section, I addressed the project design, using a Focus PDSA and the project evaluation, using Lewin's change theory and dashboard benchmarking.

Section 4: Findings, Discussion, and Implications

eCare Results

Summary of Findings

The purpose of this project was to investigate the correlation between the implementation of eCare technology and LOS, satisfaction and adherence to best practices. The data was collected by the Philips Bed Manager program installed with the eCare technology. This program has a direct interface with the current technology used by the facility, which allows all admission, medication and monitoring information to be automatically populated. This allows the program to calculate daily and quarterly data to be used for comparison and benchmarking. Once the data is calculated, the manager is able to generate quarterly reports. These reports were generated, and the student was given access to them by the manager. The program is designed to pull only necessary data from the current technology used by the facility, which eliminates the use of confidential information. Therefore, no patient identifiers are used or stored in the program.

The data provided consisted of 1st quarter 2015, which contains the months of January, February, and March of 2015. The data in Figure 1 shows the LOS data for 1st quarter 2015. The data shows actual LOS to be less than the predicted LOS, which are positive results. Only one hospital showed actual LOS to be over the predicted LOS, however, overall the LOS ratio for all hospitals is less than the predicted.
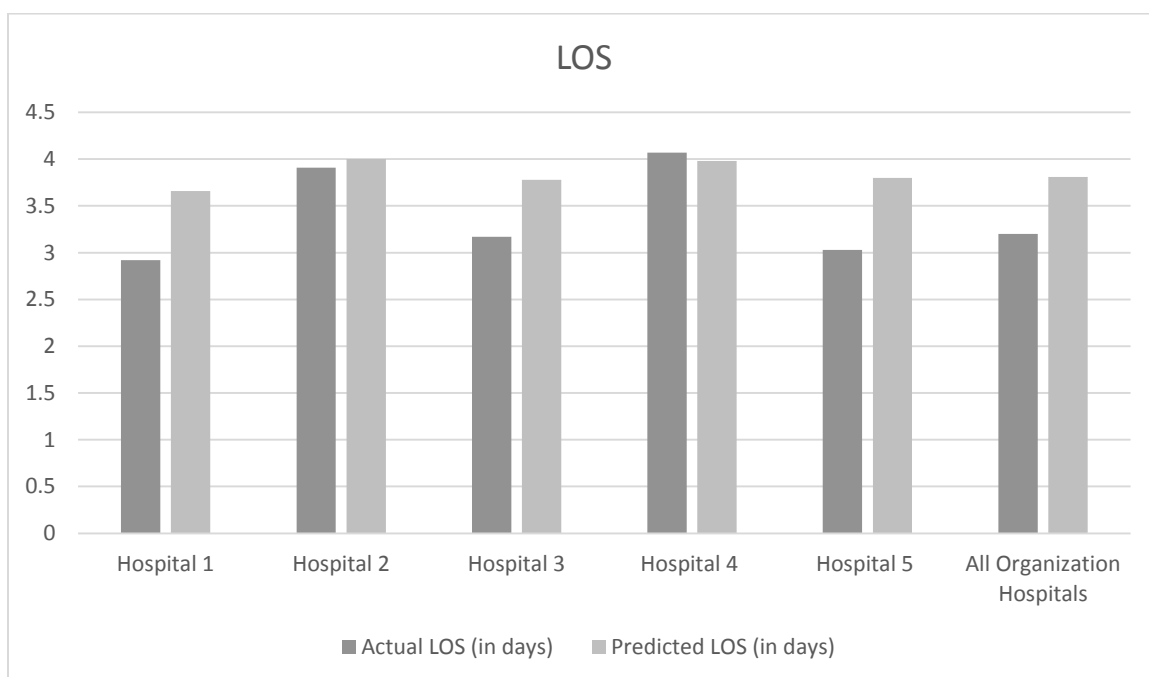
Figure 1. 1st Quarter 2015 LOS data as it is represented amongst the units within the hospital, as well as the organization as a whole (Study Sites, 2015). The actual LOS is compared side by side with the APACHE predicted LOS. Difference between actual LOS and predicted LOS is less than one day.

Patient and staff satisfaction have been considerably harder to measure for the eCare unit. The unit manager has decided not to include trigger questions in the discharge surveys. The staff satisfaction survey is set to be distributed in late 2nd quarter to early 3rd quarter 2015.

Adherence to best practices is also showing positive progress. Figures 2, 3, and 4 show the benchmarking data for best practices, as compared with all eCare units across the nation. Figure 2 shows the percentage of unit stays with complications. Figure 3 shows the percentage of patients receiving VTE prophylaxis within 48 hours of

admission. Figure 4 shows the percentage of patients receiving stress ulcer prophylaxis while admitted in the ICU. When compared with all eCare units across the nation, the organization is far above the national average. These tables provide a positive showing of compliance with best practices.

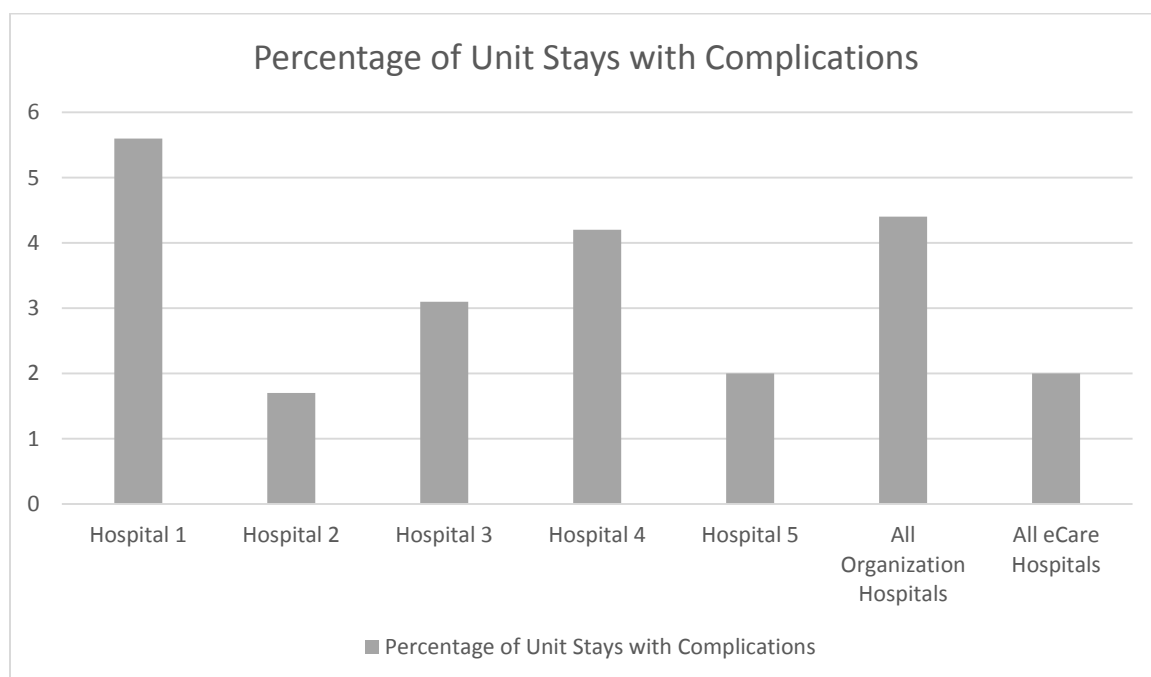
Figure 2. Percentage of Unit Stays with Complications (Study Sites, 2015). Represents the percentage of patients in the eCare unit who suffered a complication as part of their hospital course.
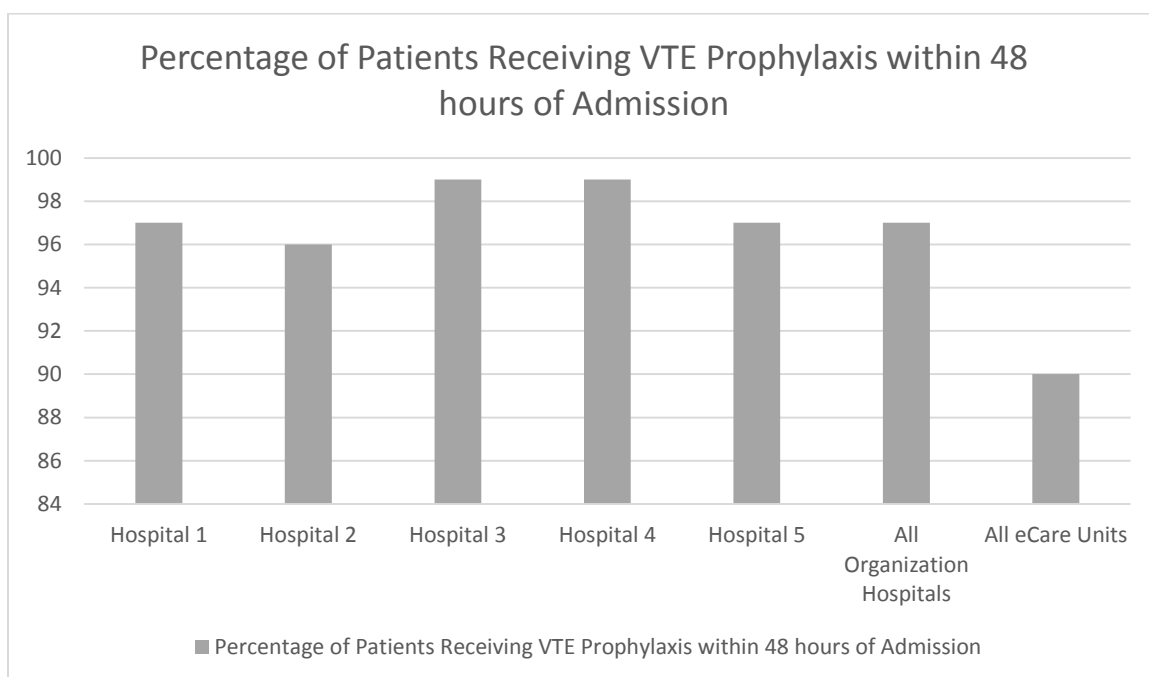
Figure 3. VTE Prophylaxis within 48 hours of admission (Study Sites, 2015). Represents

the percentage of patients admitted to the eCare unit who received VTE prophylaxis

within the first 48 hours.

Percentage of Stress Ulcer Prophylaxis in At-Risk Patients
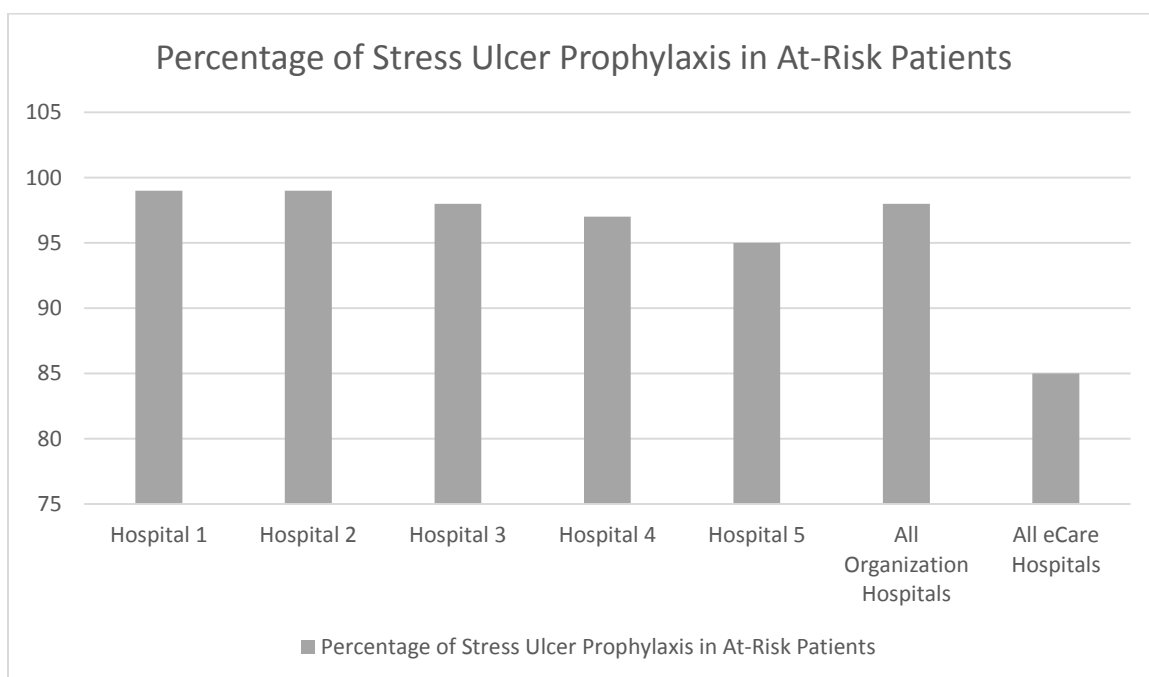
Figure 4. Stress Ulcer Prophylaxis in At-Risk Patients (Study Sites, 2015). Represents the percentage of at-risk patients admitted to the eCare unit had stress ulcer prophylaxis initiated upon arrival.

Implications

      Policy. The data results for this project are in the early phase of change and trend. With that said, policy changes have not occurred, but are being constantly reviewed for validity and applicability. One of the policies currently in revisions is the ventilator weaning protocol. With the eCare unit having a physician available on the night shift, intensivists are looking into starting the ventilator weaning on the night shift in preparation for extubation in the morning when the intensivists round. This allows the intensivists to be available on the floor in cases where re-intubation is warranted.

Practice. This project set out show a decrease in ICU LOS, increase in patient/staff satisfaction and increase in compliance with best practices as a result of the implementation of eCare technology. In order to provide quality care and improve overall patient outcomes in the ICU, there is a need for the efficiency of care (Kahn, 2011). This is thought to be achieved through the implementation of a new technology, which consists of two-way cameras equipped with audio and video capabilities. These cameras can be accessed by the staff in the eCare unit, as well as the staff and/or family members in the ICU room.

Project Strengths and Limitations

Strengths. A strength of this project is the large number of beds monitored by the eCare unit. The monitoring of 140 beds over 5 different hospitals allows for data that can be seen individually, yet combined to give a clear picture of the successes and weaknesses of the unit.

Limitations. The biggest limitation of this project is the time period of data results. The eCare unit is still in its infancy and data only reflects the first few months of use.

Recommendations for Remediation of Limitations in Future Work

Recommendations for continuance of this project is to review the data over a longer period of time. Having data over a longer period of time will allow for better comparison and development of trends. Many variables can affect data, making it important to have enough data over a long enough period of time to identify any trends, positive or negative, which could affect the project's success.

Analysis of Self

 As a nurse, all of my experience is in post-operative orthopedics, urology and ophthalmology and nursing education. This project allowed me to leave my comfort zone and seek out nursing opportunities in other specialties, while staying true to my desire to improve nursing care. Having met with my preceptor prior to starting the practicum requirements, we determined the eCare unit and its success would be a great project, as it was in the development stage and rapidly approaching live status. I was able to participate in the late planning meetings prior to launching the technology. This allowed me to see this project from not only a nursing standpoint, but from a business/project standpoint.

 The success of this unit is vital to the expansion of this technology to the remaining five hospitals in this healthcare system. The Chief Nurse Executive, and my preceptor, directly oversees this unit and project, as it is a major 2015 goal for her. Being a part of this has given me a greater understanding of what is involved in leadership, management and project facilitation. This journey has allowed me sufficient growth and development, as a nurse and scholar, which I will take with me for the remainder of my career.

<div align="center">

Impact of Project on Professional Development

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 This project has the potential to change the way nursing is provided in the intensive care units. The results of this unit can allow intensivists and nursing staff to formulate better plans of care that will aid in the decrease of LOS, increase in satisfaction and increase in overall patient outcomes.

Summary and Conclusions

The eCare unit is showing early signs of success, however, it is important to continue to trend and compare data as time goes on. The preliminary data results suggest that current staffing and duties are sufficient to provide the care necessary for positive patient outcomes. However, as with all nursing, there is always room for improvement. It is recommended to reevaluate staffing and nursing duties periodically in response to data results.

Section 5: Scholarly Product

Project Summary and Evaluation Report

For dissemination of this project, a PowerPoint presentation was given. There are

many advantages to presenting in this format. Using a PowerPoint presentation, the

presenter is able to project the material while speaking directly to the intended audience.

This allows the audience to be orally and visually stimulated. Disseminating this project

is essential to providing the stakeholders a look at the successes and weaknesses of the

unit, as well as advance the goals and initiatives set forth for the unit.

The presentation was given at the Critical Care Managers monthly meeting in

May. Those attending the meeting consisted of: Nurse Managers, Respiratory Therapy

Managers, Chief Nursing Executive, and Pharmacy Managers. This monthly meeting is

held to discuss current Critical Care practices and opportunities for improvement. Since

the implementation of the eCare unit, the meeting also contains the progress of the eCare

unit.

This presentation gave the opportunity to identify some early quality

improvement concerns which may need addressed. The purpose of this project and

presentation were to assist with propelling evidence-based practice in the intensive care

unit as it relates to LOS, satisfaction and best practices.

References

American Society for Quality. (n.d.). *Plan-do-check-act (PDCA) cycle.* Retrieved from

    http://asq.org/learn-about-quality/project-planning-tools/overview/pdca-

    cycle.html.

Boston University School of Public Health. (2013). Diffusion of Innovation Theory.

    Retrieved from http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/SB721-

    Models/SB721-Models4.html.

Center for Medicare and Medicaid Services. (n.d.). *HCAHPS: Patients' perspectives of*

    care survey. Retrieved from http://www.cms.gov/Medicare/Quality-Initiatives-

    Patient-Assessment-Instruments/HospitalQualityInits/HospitalHCAHPS.html

Connelly, M. (2014). The Kurt Lewin change management model. *Change Management*

    Coach. Retrieved from http://www.change-management-

    coach.com/kurt_lewin.html.

Goran, S. F. (2010). A second set of eyes: An introduction to tele-ICU. *Critical Care*

    Nurse, 30(4), 46-55. doi: 10.4037/ccn2010283.

Goran, S. F. (2012a). Making the move: From bedside to camera-side. *Critical Care*

    Nurse, 32(1), 20-29. doi: 10.4037/ccn2012191.

Goran, S. F. (2012b). Measuring tele-ICU impact: does it optimize quality outcomes for

    the critically ill patient? *Journal of Nursing Management, 20*, 414-428. doi:

    10.1111/j.1365-2834.2012.01414.x.

Goran, S. F. & Mullen-Fontino, M. (2012). Partnership for a healthy work environment.

    American Association of Critical Care Nurses, 23(3), 289-301. doi:

10.1097/NCl.0b013e31825c1cc2.

Grove, S., Burns, N., & Gray, J. (2013). *The practice of nursing research: Appraisal synthesis and generation of evidence* (7th ed.). St. Louis, MO: Elsevier.

Healthcare Cost and Utilization Project. (2009). *HCUP facts and figures, 2009.* Retrieved from http://www.hcup-us.ahrq.gov/reports/factsandfigures/2009/definitions.jsp

Health Management Technology. (2007). From a distance: Saving lives through remote care. *Health Management Technology, 28*(3), 26. www.healthmgttech.com.

Hoonakker, P. L. T., Carayon, P., McGuire, K., Khunlertkit, A., Wiegmann, D. A., Alyousef, B…(2013). Motivation and job satisfaction of tele-ICU nurses. *Journal of Critical Care, 28*, 315.e13-315.e21. doi: 10.1016/j.jcrc.2012.10.001.

Kahn, J. M. (2011). The use and misuse of ICU telemedicine. *Journal of the American Medical Association, 305*(21), 2227-2228. doi: 10.1001/jama.2011.716.

Kohl, B. A., Fortino-Mullen, M., Praestgaard, A., Hanson, C. W., DiMartino, J., & Ochroch, E. (2012). The effect of ICU telemedicine on mortality and length of stay. *Journal of Telemedicine and Telecare, 18*(5), 282-286. doi: 10.1258/jtt.2012.120208.

Lilly, C. M., Cody, S., Zhao, H., Landry, K., Baker, S. P., McIlwaine, J….(2011). Hospital mortality, length of stay, and preventable complications among critically ill patients before and after tele-ICU reengineering of critical care processes. *Journal of the American Medical Association, 305*(21), 2175-2183. doi: 10.1001/jama.2011.697.

Lilly, C. M., McLaughlin, J. M., Zhao, H., Baker, S. P., Cody, S., & Irwin, R. S. (2014).

A multicenter study of ICU telemedicine reengineering of adult critical care.

Chest, 145(3), 500-507. doi: 10.1378/chest.13-1973.

MedicineNet.com. (n.d.). *Definition of ICU.* Retrieved from

http://www.medicinenet.com/script/main/art.asp?articlekey=3891

Phillips. (2014). *eICU technology update.* [PowerPoint presentation]. Retrieved from

Study Site.

Ries, M. (2014). *ICU-telemedicine. Disruptive innovation.* [PowerPoint presentation].

Retrieved from Advocate Health Care.

Rincon, T. A. (2012). Integration of evidence-based knowledge management in

microsystems: A tele-ICU experience. *Critical Care Nursing Quarterly, 35*(4),

335-340. doi: 10.1097/CNQ.0b013e318266bfd1.

Romig, M. C., Latif, A., Gill, R. S., Pronovost, P. J., & Sapirstein, A. (2012). Perceived

benefit of a telemedicine consultative service in a highly staffed intensive care

unit. *Journal of Critical Care, 27,* 426.e9-426.e16. doi:

10.1016/j.jcrc.2011.12.007.

Rufo, R. Z. (2012). Use of change management theories in gaining acceptance of

telemedicine technology. *Critical Care Nursing Quarterly, 35*(4), 322-327. doi:

10.1097/CNQ.0b013e3182684f67.

Sadaka, F., Palagiri, A., Trottier, S., Deibert, W., Gudmestad, D., Sommer, S. E…(2013).

Telemedicine intervention improves ICU outcomes. *Critical Care Research and*

Practice, Article ID: 456389, 1-5. doi: 10.1155/2013/456389.

Study Sites. (2015).

Study Sites. (2014).

Taylor, G. (2013). Improving the patient experience with an eICU. *Healthcare Executive.*
https://www.ache.org/pubs/hem.cfm.

Thomas, E. J., Lucke, J. F., Wueste, L., Weavind, L., & Patel, B. (2009). Association of
telemedicine for remote monitoring of intensive care patients with mortality,
complications, and length of stay. *Journal of the American Medical Association,
302*(24), 2671-2678. doi: 10.1001/jama.2009.1902.

Wilcox, M. E., & Adhikari, N. KJ. (2012). The effect of telemedicine in critically ill
patients: systematic review and meta-analysis. *Critical Care 2012, 16:*R127, 1-12.
doi: 10.1186/cc11429.

Williams, L. M., Hubbard, K. E., Daye, O., & Barden, C. (2012). Telenursing in the
intensive care unit: Transforming nursing practice. *Critical Care Nurse, 32*(6),
62-69. doi: 10.4037/ccn2012525.

Yeo, W., Grass Ahrens, S. L., & Wright, T. (2012). A new era in the ICU: The case for
telemedicine. *Critical Care Nursing Quarterly, 35*(4), 316-321. doi:
10.1097/CNQ.0b013e318266bbff.

Appendix A: IRB Approval

The IRB approval number for this study is 05-14-15-0248653.