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Safe Removal of SecurAcath™ Device: A Clinical Guide for Nurses and Medical Providers in
the Clinical Setting

by

FELIXBERTO PIAMONTE

THESIS

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Abstract

SecurAcath™ is a subcutaneously engineered anchoring device primarily used to secure peripherally inserted central catheter (PICC) lines. The University of California, San Francisco Medical Center adopted the device into their PICC line insertion bundle in May 2019. Its operation requires competent and skilled clinicians due to the complexity of the way it is anchored in the subcutaneous layer of the skin. The Vascular Access Support Team (VAST) nurses have taken up the resource role for this procedure. Due to gaps in knowledge and training on the proper and safe removal of the device among the nurses and medical providers, the researcher created this educational module to provide an opportunity for training at the bedside by a Vascular Access Nurse Specialist. The applied project aimed to examine the usability of an educational module presented through just-in-time education, hands-on demonstration, and video-assisted training at the UCSF Medical Center acute care units in April and May 2021. The video-assisted training highlights the three different methods of SecurAcath™ removal. Each video lasts for less than two minutes. In the return demonstration, a demonstration box mimics how an actual SecurAcath™ device is anchored in the skin. A four-person panel of experts was consulted to evaluate the module's content utilizing the Likert-type questionnaire. All the experts strongly agreed with the module's content. Seven practicing nurses selected through convenience sampling were also asked to evaluate the utility of the module content using a Likert-type questionnaire. All were in favor with the module content, supporting the importance of a blended education as a learning strategy in the medical center.

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Introduction

Peripherally Inserted Central Catheters (PICCs) have been widely utilized for various intravenous therapies (Egan et al., 2013). They are the most prevalent venous access device used in hospitalized patients (Chopra et al., 2020). PICCs are primarily an indispensable part in the care of the critically-ill patients who require blood sampling, inotropic treatments, electrolyte replacements, intravenous antibiotics, and fluid resuscitation (Gonzalez & Cassaro, 2019), or only for venous access for patients experience difficult venous access. Depending on the initial indication for insertion, the PICC line may be left in place for a few days to a few months.

PICCs are particularly vulnerable to inadvertent catheter migration. The continuous “pistoning” of the catheter or the “in and out” movement may predispose the line to opportunistic infections or total catheter dislodgement. According to Merriam-Webster’s dictionary the word “piston” is used to describe how a short cylinder fitting closely within a tube in which it moves up and down (“Piston”, Merriam-Webster, 2021). Pistoning describes the movement of a PICC catheter in and out of the vessel without any proper securement (Gonzales & Cassaro, 2019). These challenges are prevalent even with the supervision of highly skilled and highly specialized vascular access team experts (Egan et al., 2013). Catheter migration can lead to adverse outcomes both in financial and economic terms and in the clinical management of patient outcomes (Yamamoto et al., 2002) that can often lead to delayed therapy and complications such as infection, phlebitis, venous thromboses, catheter leakage, and catheter replacements. These complications have significantly contributed to the untimely, multiple replacements of lines and the increased number of central line-associated bloodstream infections (CLABSIs) (Goosens et al., 2018).

The introduction of a SecurAcath™ device in the practice of vascular access was demonstrated to be a good method for securing the line and providing stability to PICC lines. It was a concept originally conceived by Michael Rosenberg, an American interventional radiologist physician (Hughes, 2014). The term “securement” refers to the security or stability of a line providing vascular access and will be used throughout this thesis. A stabilization device not only provides a better securement but also prevents possible dislodgements and accidental removal of the PICC line (Zerla et al., 2017). According to a study conducted by Yamamoto et al. (2002), inserting a central access device, such as a PICC line, increases the risk of post-insertion complications such as infection, phlebitis, thrombosis, line occlusion, and dislodgements. Therefore, they concluded that securement is essential to the integrity and stability of central venous catheters in the prevention of these complications. Their study showed that out of the 85 enrolled participants under each category of “suture” and “statlock”, the number of systemic infections identified under “suture” was 10% or 12% of which eight were confirmed cases and two were suspected (Yamamoto et al., 2002). Under the “statlock” category, there were two cases (2%) identified with one confirmed case and one suspected (Yamamoto et al., 2002). In early 2000s, the only available securement device was a sutureless adhesive-backed device, or what is commonly called nowadays as Statlock™. Later, there were only two securement options on the market, transdermal-through the skin and cutaneous-on the skin. Even then, the rate of complications was fewer with Statlock, but further studies needed to be conducted on how it helps reduce catheter-related bloodstream infections (Yamamoto et al., 2002).

Today, there are three catheter securement categories available on the market. The first is transdermal-through the skin, which includes sutures and staples. Most central venous catheters

(CVC), dialysis, and drainage catheters are secured with sutures. The second is cutaneous-surface of skin which includes adhesive devices. Some of the brand names on the market are Statlock™, Sorbaview Shield™, Wing-guard™, 3M securement device/Tegaderm™, Griplock™, and Secureport IV™. Most PICC lines are currently secured with adhesives. The third category is called subcutaneous-under the skin. SecurAcath™ is the only subcutaneous securement device available on the market. It is Food and Drug Administration (FDA) cleared for use on intravascular and percutaneous lines, such as PICCs, CVCs, nephrostomy tubes, and other percutaneous drains. It has two small, flexible, blunt feet placed just beneath the skin right at the insertion site after the central line access device is placed. It is pushed directly to the subcutaneous layer under the skin, and when released, the two feet spread open and it anchors itself to the subcutaneous tissue.

Statement of the Problem

The University of California, San Francisco (UCSF) Medical Center's Vascular Access Support Team (VAST) is the primary consulting department for PICC line placement and central line-related issues at the site. The department operates seven days a week from 0700 a.m. to 1930 p.m. The lack of manpower to address PICC line removal safety was an ongoing problem for the department. They operate by triaging cases, and priorities are line insertions. Often this policy led to multiple unheeded calls for line removals that resulted in patient discharge delays and painful line removals. The acute care unit nurses were not properly trained on the removal process, and this resulted in multiple reports of patient dissatisfaction. This incremental loss in trust among the patients and discharge delays led to the creation of this project. This project developed an educational module to provide knowledge and skills training for safe removal of the SecurAcath™ device under the supervision of a VAST RN.

Statement of Purpose

The purpose of this educational module was to provide the necessary knowledge and skills relevant for the operation of the SecurAcath™ device during its removal process at the termination of the PICC line use. It described and explained how to use a three-step process to constructively provide the necessary education needed to develop competent clinical skills among the nurses and providers at the UCSF Medical Center acute care units. Accordingly, this educational module's three-step process focused on providing a just-in-time education in a fast-paced setting that fostered dedication and attention to patient care (Beckman et al., 2009). The three-step educational process took ten minutes for the bedside didactic, demonstration box training, and video-assisted review of techniques. This educational process is a VAST RN supervised activity to ensure accuracy and safety in the removal of the device.

Significance of the Study

The educational module provides relevant training on the safe and appropriate removal of the SecurAcath™ device as a learning paradigm to develop technical knowledge and competency among nurses and providers. This project's goal was to help clinicians acquire the competence and skills necessary to manipulate a device that has significant impact on the integrity and life of central line access devices such as the PICC lines. This objective was achieved through the support of the clinical expertise of VAST nurses who were available to provide the necessary clinical expertise and education at the bedside.

Nursing has advanced dramatically in the past few decades. VAST RNs are now able to perform central line and arterial line placements at the bedside with great success and conduct lectures on vascular access specialty to new doctors and practitioners. Providing an on-demand blended didactic training through this educational module offered an excellent example of

nursing empowerment in the health field. Furthermore, this project provided resource material that could be disseminated skills training to nurses outside of the UCSF community.

Literature Review

A limited review of the literature was carried out using PubMed and Google Scholar electronic databases to provide a better understanding of the vascular access specialty role in healthcare and education. The articles searched in this review focused on subjects relevant to vascular access nursing, nursing education, and technology. In addition, this literature review paid particular attention to the utilization of subcutaneous engineered securement devices for PICCs and its impact on current vascular access practices. Such information can improve the understanding of SecurAcath™ among clinicians who are not familiar with it.

The Role of Vascular Access Nursing

Vascular access specialty care is a specific advanced nursing skill that requires months of training. Typically, the candidates chosen for this specialty have either critical care or vascular access nursing experiences. Those who are lacking such experience have to prove their commitment to rapidly acquiring the necessary education and skills in a relatively short period of time. There is a growing number of medical centers in the United States that deploy vascular access nursing teams. In a survey study by Krein et al. (2013), 575 hospitals surveyed, and 403 (60%) of hospitals said PICC lines were placed by the hospital PICC teams. Despite their growing use, however, there was little known about vascular access nurses' experience, knowledge, and practices (Chopra et al., 2016). The Infusion Nurses Society (INS) affirmed that a comprehensive approach to vascular access device care and management is essential to ensure safe, competent, and effective patient care (Meyer et al., 2020). A common consensus emerging from multiple studies identified the vascular access specialty in nursing as an organized

department whose objective is to provide science-based vascular access procedures. The practice of such teams is supported by utilizing modern technology including ultrasound-guided intravenous catheter placement (USG-PIV) and ultrasound-guided peripherally inserted central catheter (PICC) placements. Chopra et al. (2016) observed that although they often under-appreciated, ultrasound skills are relevant for hospitalists and hospital medicine. They also mentioned that vascular access nurses' knowledge and skills directly affect patient safety and clinical outcomes, and these specialists are experts whose opinions are highly valued and can aid informed decision-making and quality improvement efforts related to the practice. Although often under-valued by some providers, they are highly regarded by their nursing colleagues as advanced clinicians (Chopra et al., 2020).

Vascular access specialty requires substantial financial and administrative support from an institution for vascular access teams to thrive. Training and staffing requirements can be polarizing factors, which is why only major medical centers can provide the service. The lack of financial and educational support from these institutions often results in the limited utilization of innovative technology available to provide better healthcare.

Efficacy of Subcutaneous Engineered Securement Device

In examining the effectiveness of the SecurAcath™ as a stabilization device for CVADs, previous studies adopted various designs and involved diverse populations. Early research in 2013 to 2017 included several prospective studies conducted by vascular surgeons and interventional radiology physician experts in vascular access (Dolcino et. al, 2017; Egan et al., 2013; Goosens et al., 2018; Hughes, M.E., 2014; McParlan et al., 2019; Pittiruti et al., 2019; Zerla et al., 2017). A subcutaneous engineered securement device for PICC lines was marketed as a novel securement device during this time. It was a newer technology compared to the

customary usage of adhesive securements that were on the market for decades. The articles reviewed mainly focused on the effectiveness of the newly engineered subcutaneous securement device, now known as SecurAcath™. Pittiruti et al. (2018) concluded in their study that 98.4% of the time, this device utilization resulted in secure line securement or zero catheter dislodgements. Zerla et al. (2017) found that there were zero incidents of catheter dislodgements using the device in a one-center prospective study with 30 adult cancer patients whose treatment was expected to last more than 60 days. In a span of 4,963 catheter days and 709 dressing changes, no episode of dislodgement was recorded, and there was a lower incidence of complications, such as line occlusions.

Out of the several articles reviewed, only two studies from the United States were identified (Rowe et al., 2020; Egan et al., 2013). Egan et al. (2013) completed a multi-center prospective study of SecurAcath™ use in three different facilities. Egan and colleagues' (2013) objective was to have the SecurAcath™ device placed and removed successfully without encountering any complications causally related to the device. Sixty-two out of the 68 subjects, or 91.2%, completed their therapy without any incidence of device malfunction.

Rowe et al. (2020) performed a single-center study whose primary endpoint was to determine the risk ratio for CLABSI between the use of adhesive engineered securement device (AESD) and subcutaneous engineered securement device (SESD) for PICC lines. Based on the total number of CLABSI identified ($N = 7,732$), 15 were CLABSI PICC-specific and 823 non-PICC specific for AESD, and 32 were CLABSI PICC-specific and 6,909 non-PICC specific for SESD. Of the 7,732 CLABSI cases, 838 was the total CLABSI for AESD which had a cumulative incidence rate of 1.79%. The SESD had 6,941 CLABSI total with a cumulative incidence rate of 0.46%. The risk ratio derived was 3.88, which resulted to a percent relative

effect of 288% ($n = 47$). Thus, those who had AESD for securement had a 288% increased risk of getting CLABSI compared to those who had SESD. Although the studies reviewed involved multiple facilities and varying age groups receiving therapy through central line access, further studies were recommended to determine the probability of complication reductions, such as blood infection, vein thrombosis, and catheter dislodgement due to study limitations (Pittiruti et al., 2019).

Cost-effectiveness in Clinical Practice

Four studies discussed the economic impact of the device (Goosens et al., 2018; Zerla et al., 2017; Pittiruti et al., 2019; McParlan et al., 2019) and identified how the use of SecurA cath™ could reduce nursing time devoted to line care and management in multiple patient populations. The materials cost related to the maintenance of the conventional adhesive securement was an important finding. McParlan et al. (2019) discussed their comparative study of 1,045 patients on standard adhesive securement in 2013 and 1,139 on the SESD in 2015. The typical adhesive securement cost of the patients, which included annualized materials and procedures, amounted to £86,658 (\$119,588.04) compared to £27,336 (\$37,723.68) for the SESD (McParlan et al., 2019). Rowe et al. (2020) concurred with this finding and found the use of SESDs provided an average saving per patient of \$93.41. Likewise, Zerla et al. (2017) found significant cost savings when the two devices were compared. For more than 30 days of dwell time, both devices went through 709 maintenance procedures. Thirty SESDs were used, and 709 adhesive versions were used. Although the SESD cost more at €30.00 (\$36.00) compared to €6.00 (\$7.20) for the adhesive type, the SESD amounted to only €900.00 (\$1,080.00) whereas the adhesive device cost €4,254.00 (\$5,104.80) over the study period, which was a saving of €3,354.00 (\$4,024.80).

Post-Insertion Complication

Culverwell et al. (2020) discussed one of the most important aspects of device implementation. Removing PICC secured by a SecurAcath™ device can often mean significant patient discomfort. Culverwell et al. (2020) discussed the pain associated with three stages of the device application: during the insertion, during the dwelling period, and at the time of removal. In their study, no suggestions of pain mitigation or intervention were mentioned due to local anesthesia still in effect during the line placement. Egan et al. (2013) showed that 30 out of the 57 active participants did not report of any pain immediately after device removal. Similarly, Hughes (2014) reported that no participants complained of pain, and 18 out of the 30 participants in Zerla and colleagues' (2017) study had a pain Numerical Rating Scale (NRS) of less than 2 out of the possible 10 as most painful during the removal. When it came to the removal of the device, Culverwell and colleagues (2020) also utilized the NRS pain scale to measure pain levels and showed 58.8% of participants experienced 0 pain on the device removal, 27% reported a pain score of 2, and 9.8% reported a pain score of 4, and 3.9% reported a pain score of 5. Although that pain may be a focal point of dissatisfaction from patients receiving the device, both Culverwell et al. (2020) and Hughes (2014) mentioned in their evaluation studies that appropriate training of and confidence in the clinician is of utmost importance in operation and maintenance of the device. However, they did not note any implications of the device utilization on the associated risks of having a CAD and preventing possible complications, such as CLABSIs and blood clot formation. Pittiruti et al. (2019) mentioned that further study might be needed to investigate the potential role of the SecurAcath™ device in preventing possible complications as most of the studies only discussed the efficacy and economic implications of the device.

Although SecurAcath™ was well-researched worldwide, there are still avenues that have not been entirely well-established in its general acceptability in the clinical setting. Its usability and ease of operation and application during the insertion still have to be considered. The device is not as widely used and accepted in clinical practice and may require significant marketing and education to promote its safety, efficacy and cost-effectiveness as. To date, there are no data available as to how many hospital facilities use SecurAcath™ as their primary securement for PICC lines.

Just-in-Time Learning in Clinical Education

A unique format for bedside teaching has taken its cue from educators who advocate for just-in-time education (Baruah, 2013; Kent, 2010; Jamu et al., 2016; Bradley, 2020; Killi et al., 2015). Killi and Morrison (2015) proposed that carefully timed and designed teaching inputs could enhance learning outcomes. Baruah (2013) elaborated that the just-in-time (JIT) learning model is a learner-directed method based on intended educational content catered to the student's needs. Learning is independent of time and place and access to relevant information should be readily available at the time of need. Kent (2010) further observed that the just-in-time concept was adapted from the business world and was conceptualized as a compelling learning opportunity when provided at a specified time. JIT learning also shows that real-time education can help immerse a clinician in an actual scenario that enhances one's skills.

The JIT learning concept was further expounded by Jamu (2016) and defined as an industrial, educational opportunity provided at the time of need. JIT is a business concept model that provides learning that allows learners to access materials pertinent to their education at the exact moment in time when these materials are relevant and needed. Wisdom comes in various forms, and the learning community acknowledges that learners come in different sets of skills,

experiences, knowledge backgrounds, and interests (Baruah, 2013). The application of the JIT method in a clinical setting can address the current needs of the learners. According to Hinkle et al. (2017), clinical rotations are an undermined clinical venue for directly observed clinical practices and assessment and should be encouraged whenever possible. JIT learning could be adaptively modified based on the necessity and significance of the topic as evaluated by the educational evaluator (Kent, 2010). The JIT approach to learning allows for content customization and learner's enhanced ability to be self-directed and provide effective care (Kent, 2010).

Technological application in education can transform how it is delivered in a clinical setting; the goal is to provide education that is both thorough and efficient. Forbes et al. (2016) posited that teaching strategies that include videos provide a visual representation of fundamental clinical skills in a setting close to reality. A more direct focus on the relevance of video-assisted teaching (Forbes et al., 2016; Kale et al., 2020) supported the increasing use of videos in instructional strategies that could strengthen the quality of education in a clinical setting. Forbes et al. (2016) further supported previous studies by Cardoso et al. (2011) and Holland et al. (2012) which demonstrated that utilization of educational videos can both provide improved technological and cognitive knowledge and allow for the achievement of substantial skillsets. Multiple studies examining different clinical nursing skills evaluated the effectiveness of video-based instructions as remarkable in establishing performance outcomes as well as building confidence and satisfaction on the part of the learner (Forbes et al., 2016; Holland et al., 2012).

Methods

This educational module was created to facilitate a fast-paced, clinician-centered bedside education for both nurses and medical providers focused on the removal of SecurAcath™. It is

comprised of a five to ten minutes of didactic, video-aided teaching with return demonstration prior to the removal of the SecurAcath™ device on an actual patient. With a focus on patient safety and comfort, the module was created between October 2020 and January 2021. During this period, expert panel feedback regarding the educational methods were collected and taken into consideration in the creation of the final module content. Convenience sampling was used in the selection of the clinical participants who would utilize the educational module after it was finalized. PICC removal orders are not common as patients often leave the hospital with their PICC line still in place. The educational module was implemented when the requests for assistance were received in the medical center between March 2021 and May 2021.

Setting

The educational module was created for the nurses and medical providers working at the UCSF Medical Center. The UCSF System includes UCSF Medical Center at Mission Bay and the UCSF Medical Center at Mt. Zion. The clinical nurses and providers at the UCSF Medical Center assume an essential role in providing an effective and safe healthcare delivery by observing national standards in their clinical practice. One of the many aspects of healthcare is vascular access, which involves an array of processes and procedures that are considered highly specialized as previously described. The procedures are performed by trained and certified clinicians, such as medical providers and advanced practice nurses, who undergo rigorous training throughout their careers.

The VAST is the primary vascular access department for the UCSF Parnassus campus. Their primary function is to perform PICC line placements. Other responsibilities include central line access troubleshooting for issues such as central line access occlusions, leakages, and malposition. The VAST department works closely and collaboratively with the medical and

surgical teams to provide the most appropriate central vascular access device based on a patient's needs. Consultations for PICC line placement are requested daily through the Epic electronic health record system. When cases appear in their consult workflow, each patient's electronic health record is reviewed for prior histories pertinent to the PICC line placement. Depending on the outcome of the chart review, the patient may be a candidate for a PICC placement or deferred back to the consulting medical team for a referral to interventional radiology. The VAST department also manages most PICC line removals and discontinuation requests. Their skills are highly sought for complicated cases that require skilled line manipulation from entanglement and unmovable catheters.

Course of Action for the Educational Module Development

Content Development of the Education Module

As a response to the multiple requests for the VAST department to manage the discontinuation of PICC lines before the patient's discharge, the need for a fast-paced and learner-centered bedside education was crafted to meet the demands of skills acquisition among the clinicians. The investigator developed the education module content based on the policies and practice guidelines of the UCSF Medical Center and the current SecurAcath™ training in-service practice on insertion and removal practices. This educational module was tailored to the patient population of the UCSF Medical Center and created based on the workflow processes observed by the department. The module's contents were arranged into three categories to promote knowledge acquisition for the nurse clinicians and providers: just-in-time education, demonstration box practice, and video-assisted training.

Components of the Educational Module

Just-In-Time Learning. This education piece is one of the most important aspects of the education module. The identified clinician was provided a quick review of the SecurAcath™ anatomy and its mechanics through the provided demonstration boxes (See Appendix A) that resembled an actual patient's skin and the device as expected in a real clinical scenario. They had the opportunity to practice with it until they were comfortable and competent to perform the procedure on an actual patient under the supervision of a VAST nurse.

Return Demonstration Practice with Demonstration Box. A square demonstration box that has a soft, skin-like structure with a PICC line and SecurAcath™ embedded in it was used for practice. The participants practiced repeatedly on this device until they become familiar with the process. This method invested the tactile stimulation aspect of the training where clinicians could experience the actual manipulation of the device before approaching an actual patient (see Appendix A).

Video-Assisted Training through Quick Response (QR) Code Scanning. Three different video-assisted training streams were available for clinicians to watch and learn. These videos showcased three different PICC removal methods on an actual patient. Each video lasted for an average of two minutes. The videos were created by Interrad Medical, and the copyrights were provided by their clinical educator and marketing manager for the purposes of this education. Quick Response (QR) codes are now essential for professionals in the tech or healthcare industries (Billings et al., 2020). They are the small, black, and white squares one can scan with a smartphone. They work by creating a bar code that takes one to a website or an application. Newer technology embedded in newer smartphones now can read the codes and take

individuals straight to the linked site. This technology greatly enhances the just-in-time learning at the bedside.

Interrad Medical made it easy and accessible for nurses and providers to download the SecurAcath™ information through the QR code. The Pacific Educational and Marketing Manager for Interrad Medical gave the author permission to utilize the QR code for this educational module to make downloading the app easy and accessible. The QR codes are available for Android™ and Apple™ users (see Appendix A). Once scanned, the clinician was prompted to download the app. When the app was opened, the user had access to the following six categories: (1) placement, (2) maintenance, (3) removal, (4) helpful tips, (5) clinical data, and (6) testimonials. For the purposes of the education, the participating clinicians were encouraged to concentrate on the removal videos and helpful tips in the clinical practice or setting.

Experts' Feedback

Originally, six expert reviewers were contacted to provide feedback about the education module, but only four responded. The request for review was sent through email. Each reviewer selected responded at different times. The expert reviewers were chosen based on their expertise in the field of vascular access specialty and experience in education. Three of the reviewers were current active VAST nurses with graduate degrees in nursing education, nursing science, and management. The fourth reviewer was the manager of the Pacific Marketing and Education Director for Interrad Medical, Inc., the maker of the device. The reviewers were asked to rate their responses on a five-point Likert scale. Seven specific questions targeted satisfaction with the education module. Satisfaction was defined as the expert's general perception on the usefulness of the module's content, its presentation, and its applicability to the practice. The responses ranged from (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly

agree. No free-form responses were included in the survey, but one of the experts recommended imagery of the procedures could help provide a visual for the clinicians (see Appendix B).

Data Collection

The expert panel survey was sent via email, and there was an average response time from two to four weeks. When survey results were finalized based on the experts' feedback, the educational offering was aimed to target UCSF medical-surgical nursing clinicians and medical providers who had direct care of a patient whose PICC line was to be removed upon hospital discharge. All participants had varying degrees of nursing and medical experiences. No specific participant characteristics, such as educational level or years in nursing service, were collected for the purposes of this survey. Participation in the training was completely voluntary. Upon completion of the bedside education, the researcher provided a survey questionnaire to the participating clinicians. It was a ten-item questionnaire that aimed to assess the participant's satisfaction with both the use of technology, a hands-on demonstration and manipulation of an actual SecurAcath™ device on a demonstration box and videos presented prior to an actual patient care. The second survey was a ten-question, five-point Likert scale questionnaire. In this survey, generalized satisfaction towards the process steps employed was reflective of the technology employed for quick content review and user-centered education, confidence, and competence of the clinician and the over-all applicability of the methods. The responses ranged from (1) strongly disagree to (2) disagree to (3) neutral to (4) agree to (5) strongly agree.

Evaluation Results

Experts' Feedback

The expert panel survey was sent via email, and the average response time was two to four weeks. Only four out of the six expert panel reviewers chosen responded to the survey. All

four respondents gave positive reviews of the module. One had recommended that images be included in the module to provide visual orientation for the clinicians. The researcher emphasized that the video-assisted training provides those images as they were clearly illustrated in the videos. Overall, feedback received from the expert panel survey resulted in a 100% favorable approval (see Appendix B).

Clinical Participants' Data

The clinician survey was conducted immediately post-procedure in a paper format. The survey responses assessing satisfaction with the educational offering were favorable overall. Of the seven respondents, two (29%) gave a Likert score of “Agree” and five (71%) gave a Likert score of “Strongly Agree.” Overall feedback indicated that the clinicians found the methods easy to understand, readily available, and concise. The feedback provided a general consensus that they liked the educational blueprints used with regard to usefulness of content and the dynamics involved. The results also indicated that the presence of the vascular access nurse specialist supervising the education and practicum part of the process provided them with the confidence to the activity (see Appendix C).

Discussion

The educational module received a positive response from the nurse clinicians and providers. The three components of the educational module were perceived to be concise, easy to follow, and informative. The provided supervision from the vascular access nurse during the training added extra confidence to the participants. The techniques utilized are proportional to the current nursing education system wherein students are both exposed to simulated learning experiences (SLEs) and clinical learning experiences (CLEs). Hansen and Bratt (2017) showed that both SLEs and CLEs, regardless of the sequence between the two incidents, did not lead to

differences in subjects' competency scores. The approach described allows a systematic follow-up analysis of the extent to which clinical procedures are influenced by factors, such as learning new skills in a short period, video-assisted training, and actual patient care return demonstrations.

Given the positive response to this approach, it is worthwhile to examine how future training of nurse clinicians and providers can be conducted at the bedside in a brief session but with robust and concise information and the use of available technology. A concrete example is the SecurAcath™ app, which is a mobile application that will soon be adopted at UCSF. It provides direct access for the learner to view two-minute short videos on maintenance and removal, helpful tips, and direct access to the SecurAcath™ 24/7 clinical support line. As nursing expands its roles and responsibilities, specifically the vascular access specialty, there is a growing need to develop and transition to a more effective approach in nursing education and skills training. This project recognized many hurdles that pose some degree of difficulty for nursing and medical providers related to their busy schedules, task-oriented activities, and diverse clinical backgrounds. The vascular access support team taking the role as the educator opened up opportunities to improve hospital practices, such as the potential need to better educate nurses and providers on how to safely remove PICC lines without causing undue discomfort. Additionally, staffing plays a vital role in this educational endeavor, and nursing management support is essential. It is hoped that this platform will be sustained and be integrated into the hospital's policy and procedure guidelines.

Implications for Nursing Education

This educational offering served as an excellent resource for clinical nurses and medical providers. Taking the responsibility for safely working with vascular access devices in a clinical

setting often creates some degree of anxiety for inexperienced clinicians. The SecurAcath™ device has been in the market for less than ten years and has only recently been increasingly used in UCSF healthcare system. Before implementing the device, there was no systematic method or protocol established to remove this device safely during a PICC removal.

The vascular access support team has been solely responsible for removing all PICC lines. Therefore, this educational offering is timely and relevant in response to the increasing number of PICC line removal requests. The methods discussed in this educational offering highlighted how the utilization of providing teaching at the bedside on-demand with technological tools was efficient and effective. Nurses can access their mobile devices and reference the app embedded in the VOALTE™ phone system and review short, informational procedural videos. Additionally, the utilization of demonstration boxes allows for practice at the bedside by the clinician under the supervision of a competent, expert clinician.

This process allows for bedside didactic instruction and virtual practice of procedures before applying them to an actual patient. The ease of integrating these identified educational methods and tools make this clinical practice enjoyable and easy. Of course, as with the competency skills check, an actual bedside assessment of the skills should be conducted annually. Continuous practice is a significant reminder that specific skills are necessary and must be performed correctly as they involve manipulating a device that is still in the patient's body.

This educational offering was successful and will be available for the clinical nurses and medical providers employed at the UCSF Medical Center System. The Institute of Nursing Excellence education department will review the educational module to start implementing the training in the future. The generalizability of the skills checklist employed in the competency assessment is limited to this educational offering and UCSF Medical Center clinical nurses and

medical providers. Potentially, the Institute of Nursing Excellence education department may adopt the methods employed and the competency skills checklist utilized in the process.

Limitations and Lessons Learned

The methods employed were highly appreciated by the nurses and providers who participated during the implementation period as reflected by the survey outcomes. In a typical VAST workflow, the day's agenda includes the assessment and review of patient electronic health records before the approval of a PICC consult. Typically, the department runs with three vascular access nurses on a given shift. Apart from the miscellaneous requests, such as central line trouble-shooting and peripheral intravenous placements, the VAST department also gets consulted by the emergency department for any vascular access-related issues. These additional requests take time away from their primary function as PICC nurses. The educational module execution would have been more efficient if a different VAST nurse was available to conduct the training. This way, PICC dedicated time would have been provided without disruptions in the typical workflow.

Another issue identified was the availability of the providers. During the implementation, only a few of them were willing to participate. Their busy schedules created conflicts, and minimal time was available for participation. Nevertheless, a few nurse practitioners were willing to step away from patient care to participate in the brief teaching activity. The overall implementation period was limited to two months, and requests for discontinuation of PICC lines were limited during this time. The project would have covered more clinicians and providers if time had allowed. Furthermore, it is essential to have thorough knowledge about the SecurAcath™ device when establishing an educational module. For those institutions whose PICC teams are considering this educational module, the use of the SecurAcath™ device must be

a standard component of the PICC insertion bundle as skills are developed only with continuous practice.

Future Research

SecurAcath™ has been in the market for approximately ten years, but it is still not widely used as a primary securement device for PICC lines. Despite the evidence demonstrating its efficacy, cost-effectiveness, and safety, only a handful of medical centers in the United States use the device. To date, little is known about the number of vascular access teams around the country that utilize the device as their primary securement for PICCs. Abroad in 2017, the United Kingdom's National Institute for Health and Clinical Excellence (NICE) commissioned The King's Technology Evaluation Center to independently critique SecurAcath™ for its clinical and cost-effectiveness. After their thorough studies in that same year, NICE recommended a guidance for the adoption of SecurAcath™ for securing PICC lines within the National Health Service (NHS) (Macmillan et al., 2018).

Further follow-up with the previously established research needs to be conducted on the effects of the device in the prevention of probable complications such as those mentioned by Dolcino et al. (2017) in their study. They proposed that using SecurAcath™ could reduce the risk of line infection, venous thromboses, and dislodgements (Dolcino et al., 2017). There is no current tracking system to quantify the number of PICC line migrations. Most literatures available mention only their medical center specific data. Currently, there is no national data on PICC dislodgement cases available for comparison. Even the UCSF Medical Center does not have a standard documentation process that records all instances of line migrations.

Incorporating this educational module into the nursing policy and practice guidelines would create an opportunity for all nurse clinicians and providers to learn and acquire knowledge

and skills in understanding the complex operation of the device. Support from the nursing administration is imperative. Their oversight power on almost everything nursing-related activity could help establish the necessary guidelines to make the training mandatory for all nurses and providers for their annual skills check. As with the UCSF VAST department and all other PICC teams out there, improved staffing and increased visibility and attendance to town hall meetings could also create opportunities for education through poster presentations and training opportunities for all interested disciplines.

Conclusion

The participants' positive responses to this educational module yielded valuable insight into how future educational trainings can be performed at the bedside. The educational module components were designed to encourage bedside teaching of clinical procedures utilizing just-in-time education, practice demonstration, and procedure review through video-assisted training that could be accomplished in brief sessions. The educational module was clinician-centered with its primary objective geared towards the clinician's success in performing the procedure safely in accordance with the existing policies and procedures. The supervised training by the vascular access support nurse has contributed to the reduction of anxiety and increase in confidence among the participants. The educational module has the potential to provide professional growth and for nursing clinicians and providers to acquire opportunities to practice skills that would result in improved patient care.

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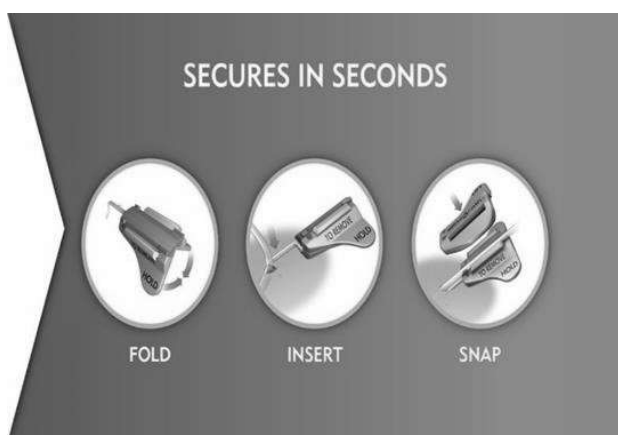
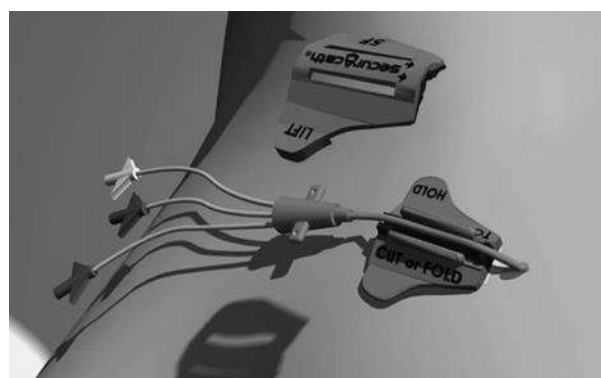
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Appendix A: Training Content Removal of SecurAcath™



Appendix B: Expert Panel Review Survey

1. Were the Three Step Method presented as guidelines to SecurAcath™ removal easy to understand?
 Yes
 No
2. Was the educational language used in the instructions clear?
 Yes
 No
3. Were the instructional videos clear and concise for the removal process?
 Yes
 No
4. Do you think these videos will help clinical nurses and medical providers understand the process and facilitate learning towards competency?
 Yes
 No
5. If QR scanning were allowed or if the SecurAcath™ app was installed in the VOALTE phones, would that provide convenience and quick reference guide for clinical nurses or medical providers?
 Yes
 No
6. Would you consider a VAST (Vascular Access Support Team) RN important towards providing the bedside training and competency checks for all clinicians (RNs and MDs)?

Yes

No

7. Would you consider including this SecurAcath™ removal guidelines in the Central Line Care and Management Policies and Procedures?

Yes

No

Appendix C: A Survey Questionnaire for Clinical Participants

Name: _____ Unit/Dept: _____

Date: _____

Please indicate a check mark (✓) which correspond most closely to your desired response.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The teaching methods used were helpful in understanding the safe removal of SecurAcath™.					
The instructions were worded appropriately and were easy to follow.					
Using the demo box for practice on the removal process made it easier to understand the concept.					
The videos on the step-by-step removal process were short and concise, and easy to follow					
The SecurAcath™ app made it easier to do the task of removing the SecurAcath™ device.					
The Vascular Access Specialist RN made me at ease in performing the task during my training.					
Having the SecurAcath™ app available in my VOALTE phone means I can always review the process anytime.					
I feel more confident now than before in removing the SecurAcath™ device.					
This training gave me a sense of security in taking care of my patient's PICC line removal orders in the future.					

Having a competency skill check as part of the annual departmental competency skills day on managing SecurAcath™ removal is relevant to my role as a clinician.					
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