

Empowering Caregivers: A Proactive Approach to Preventing CLABSI

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Abstract

Pediatric patients with central venous access devices are at increased risk for central-line-associated bloodstream infections due to their level of activity and lack of awareness of limitations. Caregivers of pediatric patients are typically the primary advocates for their children and often play a role in ensuring the completion of infection prevention strategies. This project aims to determine if dispersing an educational video to caregivers of hospitalized pediatric patients with central venous access devices can influence rates of central-line-associated bloodstream infections. This 2-month project was conducted on a nonprofit pediatric hospital's 46-bed hematology/oncology unit. Participants were English-speaking, over 18 years of age, and were the caregivers of a hospitalized patient with a central venous access device. Participants received a flyer with three QR codes. The participant then sequentially followed each link to participate in the pre-intervention test, watched a four-minute educational video, and then completed the post-intervention test. The outcomes assessed were central-line-associated bloodstream infection rates and caregiver knowledge of central venous access device care. A data review showed a 0.87 increase in the average scores on the caregiver knowledge tests. There was no change in the number of central-line-associated bloodstream infections. Pediatric patients with central venous access devices are at increased risk for central-line-associated bloodstream infections, and educating caregivers about central venous access device care can empower them to participate in infection prevention practices. Using a central venous access device educational video can increase caregiver knowledge.

Keywords: Caregivers, CLABSI, Educational Video, CVAD, Pediatrics

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Bloodstream infections related to central venous access device (CVAD) use continue to be an ongoing issue in healthcare despite numerous efforts to address complications. While this issue can affect all populations, children with central lines are at an increased risk for these infections due to a lack of awareness of limitations. Pediatric patients with a CVAD have increased risk factors for central-line-associated bloodstream infections (CLABSI), but often have a caregiver at the bedside invested in their health, influencing their health outcomes. Infection prevention bundles have frequently been used to address this issue; however, incorporating caregiver education may influence infection rates related to CVAD use. This paper aims to describe how an educational video regarding CVAD care was created and disseminated to caregivers of hospitalized pediatric patients with CVADs to influence rates of CLABSI.

Background and Significance

CVADs in hospitalized patients are necessary for various acute and chronic illnesses. Given the vital role a CVAD plays in healthcare, its use will continue despite the potential risk of a CLABSI. The Centers for Disease Control and Prevention (CDC) defines a CLABSI as a bloodstream infection with no other known sources of infection (Altounji, 2020). It is diagnosed by a laboratory-confirmed blood culture growing a pathogen or organism (Novosad et al., 2020). Following an analysis of recent literature, the sources and origin of CLABSIs are multifactorial. They can be related to the patient's primary diagnosis, duration with a CVAD, and any other underlying conditions (Wendel et al., 2021). To reduce the incidence of CLABSIs, current research must be analyzed to determine risk factors and modifiable elements that may affect morbidity and mortality.

Pediatric Patients with CVADs

Pediatric patients comprise a vast range of ages, generally including birth to 21 years of age. There are various reasons why a pediatric patient may require a CVAD; common diagnoses associated with CVAD use include hematological disorder, oncology patients, cystic fibrosis, intestinal failure, immunodeficiency, renal failure, infection requiring extended antibiotic use, or any other critical illness requiring stable venous access (Rinke et al., 2021). A CVAD can include peripherally inserted central catheters, subcutaneously implanted ports, and tunneled or non-tunneled CVADs (Wolf & Milstone, 2020). CVADs can improve quality of life by ensuring established venous access, delivering medication or nutrition, and avoiding repeated painful venipunctures (Beck et al., 2019; Soto et al., 2022). Despite its necessity among acute and chronically ill children, one of the potential complications of CVADs is CLABSI.

Patient and Caregiver Empowerment

Caregivers are typically the primary advocates for their children and should always feel empowered to seek care that will result in the best outcomes for their children. Healthcare providers receive formal training on infection prevention to prevent hospital-acquired conditions (HAC), but caregivers often have a knowledge deficit related to infection prevention. Patients and their caregivers should feel empowered to hold themselves and providers accountable for proper infection prevention techniques. Suttle et al. (2019) found that by educating and empowering patients and their caregivers, there was a 43% reduction in the rate of CLABSIs in their studied population. Implementing caregiver and patient engagement can help create a culture of accountability and allow them to participate in the care of their CVAD (Sollazzo et al., 2021). Moreover, a collaboration between patients, caregivers, and healthcare providers can influence the incidence of CLABSI rates (Suttle et al., 2019).

Prevention Bundles

Many institutions use infection prevention bundles to reduce the incidence of HAC CLABSI. Bundle elements can vary by institution but typically include a daily assessment of central line requirement, line day, hand hygiene, a daily bath including chlorhexidine gluconate (CHG), and weekly dressing changes (Adawee et al., 2023). Research has shown that using CVAD care bundles can significantly decrease the rates of CLABSI (Chaiyakulsil & Pharadornuwat, 2021). However, the bundles must be used and documented in the electronic health record (EHR) to be beneficial. Various factors can affect bundle compliance, including limited time during a shift, the need for additional staff assistance, workflow challenges, and family refusal (Woods-Hill et al., 2021). While infection bundles have been shown to have positive results, they must be used correctly and consistently to yield optimal results when considering CLABSI rates.

Decreased Incidence of CLABSI

Given the need for indwelling CVADs in long-term intravenous access and various indications for CVADs in the pediatric population, the prevalence of CVAD use is likely to continue. The desired outcome after appropriate interventions would be a reduced or zero incidence of CLABSI, which would decrease hospital stays and improve morbidity and mortality (Chaiyakulsil & Pharadornuwat, 2021). Since CLABSI rates continue to be prevalent in many institutions, more efforts should be made to target CLABSI prevention in the acute care setting (CDC, 2010). Incorporating caregiver education and prevention bundles may be a valuable strategy for reducing the incidence of CLABSI.

Internal Data

A nonprofit hospital serving the acutely ill pediatric population in the Southwestern United States has identified increased rates of CLABSI throughout multiple patient care units. This organization's mission involves encouraging hope and healing and providing quality healthcare to children and their caregivers. In 2022, the CDC reported 23,389 CLABSI nationwide. At this hospital, there were 51 CLABSI among various units in 2022. To tackle this nationwide issue, all institutions must track data to foster advancement and improve patient outcomes internally.

PICOT Question

A review of the literature led to the clinically relevant PICO question: “For hospitalized pediatric patients with CVADs on a hematology/oncology floor, how does caregiver central line education regarding caregiver expectations affect the incidence of CLABSI compared to a bundle that does not include patient and caregiver education?” and led to the following exhaustive search.

Search Strategy

An extensive literature search was performed using the following databases: PubMed, Medline, and Cumulative Index of Nursing and Allied Health Literature (CINAHL). These databases were chosen for this literature search as they offer a thorough database of evidence-based biomedical and nursing research. Each database used produced applicable and pertinent results.

Keyword Selection

Keywords *such as central venous catheter, CLABSI, caregivers, education, and pediatrics* were initially chosen and searched separately. For a more exhaustive search,

concurrent terms for each keyword were included using Boolean connectors. *CVAD*, *central venous catheter*, and *CVC* were included for *central venous catheters*. The concurrent terms for *CLABSI* encompass *central line infection* and *central line-associated bloodstream infection*. For the term *caregivers*, the terms *parents* and *family* were included, and for the term *education*, *instruction*, *knowledge*, and *awareness* were incorporated. Lastly, the concurrent terms for *pediatrics* included *children*, *youth*, and *kids*.

Initial and Final Search Yields

Without inclusion or exclusion criteria, an initial search with the keywords yielded limited results. However, with the addition of concurrent terms, 1,204 results were generated among all three databases. Keywords were combined differently to yield 57 in PubMed, 65 in Medline, and 35 in CINAHL. When reviewing titles and abstracts for significance to the chosen topic, many articles needed to be more pertinent to the PICO question, or duplicates were found among the databases. Therefore, these articles were disregarded, leading to a final yield of 28 relevant and appropriate articles. Upon further review of the applicability of these articles, inclusion criteria were incorporated to narrow the search further to 15 articles. Rapid critical appraisals were completed to choose the final ten articles for this literature review. These ten studies were kept for an exhaustive appraisal to be completed. These studies included six pre- and post-intervention studies, one randomized control study, one qualitative study, one quasi-experimental study, and one systematic review.

Limitations, Inclusion, and Exclusion Criteria

The literature review aims to generate research and studies regarding the role of caregiver education in CLABSI prevention. Many studies focused on the outpatient setting, and finding research regarding inpatient populations was challenging. Despite these limitations, significant

research has been produced on the pediatric population. Additionally, many pre- and post-intervention studies were identified among other quantitative studies. To facilitate applicable search yields, inclusion criteria were implemented involving studies within the last five years and studies focused on the pediatric population. Exclusion criteria included non-English studies, animal studies, articles not addressing caregiver knowledge, non-academic articles, or books.

Critical Appraisal and Synthesis of Evidence

Ten studies were chosen from the literature search and evaluated for validity, reliability, and relevance to the subject matter using a rapid critical appraisal (RCA) tool (Melnik & Fineout-Overholt, 2023). Eight of the ten studies used quantitative data (see Appendix A, Table A1), and two used qualitative data (see Appendix A, Table A2). With the RCA of each article, the studies' design, sample, setting, purpose, variables, data analysis, weaknesses, strengths, and conclusions were evaluated. There were six pre- and post-intervention studies, one randomized control study, one qualitative study, one quasi-experimental study, and one systematic review. All the studies' samples were homogeneous, with nine out of ten focusing on the pediatric population. While most of the studies focused on the inpatient setting, two articles included data from the outpatient setting, and one solely focused on the outpatient setting. Various interventions were used, but 50% of the articles included a caregiver educational video for CVAD care and CLABSI prevention. Following each article's RCA, the major findings of each study were synthesized to evaluate common themes and methods (see Appendix A, Table A3).

Purpose

When reviewing the research regarding CVAD care and CLABSI prevention, there is evidence that suggests that focusing on caregiver education can affect CVAD complication rates. Empowering caregivers to take an active role in the care of the CVAD makes them less likely to

be burdened and anxious about the CVAD and will likely have lower CLABSI rates. CVAD education for the caregiver should focus on daily CVAD care and infection prevention strategies. Caring for CVAD includes keeping the dressing clean, dry, and intact and ensuring connection tubing is handled properly and kept clean. Strategies for CLABSI prevention include proper hand hygiene, daily completion of all elements of the CLABSI prevention bundle, comprising of daily oral hygiene, bathing, linen, and garment change. Educating caregivers on the various elements of CLABSI prevention and explaining its benefits makes them more likely to encourage their children to participate in these strategies. Evidence varies on how this education should be dispersed, but it can include group learning sessions, handouts or booklets, competency checklists, or educational videos. Given the influence caregiver education can have, inpatient facilities should consider implementing education with caregivers of patients with CVADs during admission to decrease the incidence of CLABSI rates and other CVAD complications. This instruction can be disseminated in the form of an educational video.

Theory Application

The Health Belief Model (HBM) is a widely recognized theory of health behavior that was created initially to rationalize why people may have difficulties participating in behaviors that prevent and detect disease (Butts & Rich, 2021). With the HBM, health motivation is the primary focus, and health behavior is influenced by the individual's awareness and perception of a disease that affects approaches to counteract it (Butts & Rich, 2021). This theory discusses four main constructs that influence an individual's actions to prevent, screen, and treat illness: perceived benefits, perceived barriers, perceived severity, perceived susceptibility, and two modifying constructs that include self-efficacy and cues to action (see Appendix B, Figure B1).

When applying the HBM to caregiver education of CVAD care, it can be described as (a) perceived susceptibility: caregivers understanding that having a CVAD puts their child at high risk for CLABSI; (b) perceived severity: CLABSI is a serious condition that can contribute to morbidity and mortality; (c) perceived benefits: caregivers having direct control and influence over the care of their child's CVAD can decrease complications and contribute to their child's overall health; (d) perceived barriers: caregivers perception of difficulties with CVAD care, e.g., active young child, multiple lumens/connections, need for frequent accessing of CVAD, can be influenced by the caregiver with proper instruction; and, (e) self-efficacy: when the caregivers are given proper instruction about CVAD care they will be more confident in their abilities to prevent CLABSIs.

Implementation Framework

The Rosswurm and Larrabee Model for Evidence-based Practice guided the implementation process for this project (see Appendix B, Figure B2). This model involves six steps and aims to guide the practitioner throughout the change process, starting with evaluating the need for change and ending with implementing the new protocol piloted by evidence (Rosswurm & Larrabee, 1999). Implementation of the project to each step can be described as (1) assess the need for change: CLABSI data reviewed from the last two years and identify units with the most risk; (2) link problem with interventions and outcomes: considered current practices for CLABSI prevention and what elements could be included such as caregiver education; (3) synthesize best evidence: literature thoroughly reviewed regarding efforts to decrease CLABSI prevention with the use of CVAD care education for the caregiver; (4) design a change in practice: create a CVAD educational video for caregivers detailing infection prevention steps and best care practices for the CVAD; (5) implement and evaluate practice

change: once an education video is created and approved, it will be implemented on one select unit and data will be collected and analyzed; (6) integrate and maintain the practice change: if the intervention has been shown to improve outcomes and caregiver confidence plans will be made to implement the project hospital-wide. Given that this model assesses current practices to implement evidence-based change using defined steps, it is appropriate for implementing this project (Rosswurm & Larrabee, 1999).

Setting and Stakeholders

The organization in which the project was implemented is a nonprofit hospital that serves acute and chronically ill pediatric patients in the Southwestern United States. The project was first implemented on one unit; the chosen floor was the hematology-oncology unit with 46 beds. This project's key stakeholders included patients, caregivers, bedside nurses, unit nurse managers, unit educational specialists, physicians, and advanced practice providers. Patients are stakeholders because they have the potential to benefit from the project. Caregivers are stakeholders because they will directly participate in the project and receive the education. Bedside nurses, the unit nurse manager, and the unit educational specialist are all stakeholders because they assisted the primary investigator with the implementation of the project. However, the unit nurse manager was vital in ensuring compliance was consistent, and the unit educational specialist was critical in ensuring compliance was sustained in the long term.

Methods

Participants

The project was conducted in a single unit of a nonprofit hospital in the Southwestern United States, consisting of 46 beds. Inclusion criteria included being a caregiver of a hospitalized pediatric patient with a CVAD in the hematology-oncology unit and being English-

speaking. Exclusion criteria included caregivers of critically ill patients, non-English-speaking caregivers, or caregivers who cannot read or write in English.

Intervention

After collaboration with stakeholders, an evaluation question was created: How can a CVAD care educational video for caregivers influence CLABSI rates in hospitalized pediatric patients? Following a review of current policies regarding CVAD care and infection prevention bundles, a four-minute video was created that outlined these expectations from a caregiver standpoint. The video included information regarding infection prevention practices such as handwashing and the need for daily baths, oral care, and garment and linen changing. Additionally, it contains information about when a dressing change is indicated and how to manage connected tubing extensions, e.g., keeping away from the diaper area and off the floor. The video was in English, at a fourth-grade level of understanding, and was posted on a private YouTube page with an associated QR code. A flyer was created with three QR codes: one that linked to the pre-intervention test, one that linked directly to a website page with the educational video, and one to the post-intervention test. Once a week for two months, the principal investigator rounded on the unit and spoke with the bedside nurses to identify patients who met the inclusion criteria. After qualifying participants were identified, caregivers were given the flyer with the three QR codes explaining the order to scan (see Appendix C, Image C1). The pre-intervention test contained questions regarding information covered in the educational video. After completing the pre-intervention test, caregivers scanned the QR code linked to the educational video. After watching the video, caregivers scanned the QR code to take a post-intervention test identical to the pre-intervention test. This implementation portion of the project was completed from October 2024 to November 2024. In addition to the pre- and post-

intervention tests of caregiver knowledge, a retrospective data review was conducted to review rates of CLABSI before the implementation of the project, and rates of CLABSI after implementation were assessed. Data was compiled and reviewed from December 2025 to April 2025.

Data Collection and Measurements

The pre-intervention test assessed the caregiver's knowledge about their role in CVAD care and CLABSI prevention while inpatient before watching the educational video. It consisted of one question for a unique patient code and five knowledge questions (see Appendix C, Image C1). After completing the pre-intervention test and watching the educational video, the participant completed a post-intervention test. The post-intervention test assessed whether there was a difference in the caregivers' knowledge about their role in CVAD care and CLABSI prevention after watching the educational video. It consisted of six identical questions from the pre-intervention test, including one for a unique patient code and five knowledge questions. It also contained an additional optional open-ended question in which the participant was invited to share any suggestions for changes to the education (see Appendix C, Image C2). Face validity was conducted to ensure that the questions on the pre- and post-test appropriately measure knowledge of CVAD care and CLABSI prevention. To do this, a doctorally prepared clinical professor at Arizona State University (ASU) reviewed the questions to confirm their suitability for the project. Caregiver knowledge before and after the intervention was analyzed using descriptive statistics.

In addition to assessing changes in caregiver knowledge, data regarding CLABSI rates were obtained. The partner site provided de-identified data regarding CLABSI rates on the hematology-oncology unit over the two months before the intervention's implementation.

Additionally, deidentified data were obtained regarding CLABSI rates on the hematology-oncology unit during the two months of implementation and two months following implementation. The data would determine if CLABSI rates decreased during or after the intervention. The CLABSI data was analyzed by using descriptive statistics.

Budget and Financing

This project's proposed budget was created (see Appendix C, Table C3). The primary expenses were related to printed resources needed for the project. The principal investigator (writer) and co-principal investigator were responsible for all direct costs. Staff and participants' involvement in the project was voluntary, and they did not receive compensation for participation. No external funding was obtained for this project.

Ethical Considerations

Three ethical principles guided this project: respect for persons, beneficence, and justice. Involvement in this project posed no physical risks to participants. Informed consent was obtained by including a welcome page in the link to the online pre-intervention test that outlined the potential benefits of participation, discussed the voluntary nature of participation, and described the protection of privacy. By continuing to the pre-intervention test, implied consent was given by caregivers of patients with CVADs. The patient demographics were not collected as they did not affect the project outcomes. No personal identifiers were collected, but one question asked the participant for the first two letters of their mother's name and the last two digits of their phone number. This created a unique patient code to individually link the pre- and post-intervention tests in a de-identified method. Approval for this project was obtained from the Research Determination Committee of the project site and the ASU Institutional Review Board.

Both reviewed the project methodology to ensure that ethical principles are followed and participants' human rights are protected

Results

Twenty-four caregivers were recruited and enrolled to participate in the project. However, eight were lost to attrition (33% attrition). Sixteen caregivers participated in the pre-intervention test, watched the educational video, and then participated in the post-intervention test. Demographic information was not obtained, but all participants were over 18 years of age.

Infection Rates

Two HAC CLABSIs were reported on the unit two months before the intervention, five HAC CLABSIs were reported on the unit during the intervention, and two HAC CLABSIs were reported on the unit in the two months following its implementation (see Appendix D, Figure D1). These results may indicate that the educational video for caregivers did not affect the rate of CLABSIs on the unit. However, the small sample size makes it difficult to determine cause and effect.

Knowledge

Descriptive statistics were used to analyze the caregivers' knowledge of CVADs and CLABSI prevention strategies before and after watching the educational video (see Appendix D, Table D2). The average score on the pre-intervention test was 3.88 (SD=0.62). The scores ranged from three to five points. The average score on the post-intervention test was 4.75 (SD=0.45). The scores on the post-intervention test ranged from four to five points. These results indicate that the educational video increased the mean score of the test by 0.87. Therefore, this intervention was effective in improving caregiver knowledge related to CVAD care and CLABSI prevention.

Qualitative Data

In the post-intervention test, an additional open-ended question allowed participants to give feedback and/or suggestions regarding the project. This question was optional and not required to submit the post-intervention test. One participant highlighted that the video cleared up confusion regarding an aspect of the infection prevention bundle. Another participant stated, “This was a great video.” While not a direct measure of this project, these comments by participants further showed that the educational video was effective in educating caregivers about CVADs and infection prevention strategies.

Project Impact

While this project ultimately did not impact rates of CLABSI, it can impact caregiver knowledge and ultimately empower caregivers to continue to play an active role in CLABSI prevention. After watching the educational video, the caregivers’ knowledge of CVAD care increased. This impacts the patient because if their caregiver is more involved in infection prevention practices, they likely will encourage their child to be more engaged in those same interventions. Furthermore, educating the caregivers allows for a greater partnership between the caregiver and medical staff, such as providers, nurses, and patient care technicians. In turn, this partnership positively impacts the entire hospital system by increasing overall satisfaction through collaboration and, potentially, allowing for greater adherence to hospital policies involving infection prevention practices. Additionally, incorporating education in a video removes some burden from the bedside nurse during their shift, allowing caregivers to obtain the education they need regarding their child’s CVAD despite busy workflow challenges.

Sustainability

When clear expectations are laid out to the caregiver, adherence to infection prevention strategies is more likely. With its focus on empowering caregivers, this project could increase caregiver knowledge regarding CVAD care and CLABSI prevention practices, offering a hopeful outlook for healthcare. To continue efforts made with this project, the intervention should be implemented on all units, as the other units also admit patients with CVADs. The educational video is distributed via QR code on a flyer to caregivers of patients with CVADs. Still, to continue removing the burden from the bedside staff, efforts could be made to work with the information technology (IT) department to have an automatic text sent to the caregivers when a CVAD parameter is created in the EHR. When the caregivers watch the video, their participation in this education will automatically be documented in the EHR. The QR code could also be included in the hospital's already-created patient education booklet. Additionally, this institution sees many patients who speak other languages, such as Spanish; therefore, having the video translated into different languages would allow these populations to also benefit from participation in this education. Ultimately, these plans will continue efforts to reduce hospital-acquired CLABSIs and increase compliance with infection prevention practices.

Discussion

When creating this project, the goal was to decrease rates of CLABSIs in the partnered unit using a CVAD educational video for caregivers of hospitalized pediatric patients with CVADs. A secondary goal measured in this project was the caregivers' knowledge related to CVAD care and CLABSI prevention practices. While there was no change in the rates of CLABSI in the unit, there was an increase in caregiver knowledge related to CVAD care and CLABSI prevention strategies. Ultimately, this project showed that caregiver education

reinforces knowledge about current infection prevention strategies in this hospital, which, in turn, can impact and improve patient outcomes.

Limitations

There are a few limitations that may have affected the outcomes of this project. One limitation includes the minimal participation in this educational intervention. With only 16 participants total in two months on a 46-bed unit, it is difficult to say that such a small sample size could have affected the CLABSI rates on the unit. Another limitation of this project is that the unit had another CLABSI reduction project during this project intervention, potentially affecting the CLABSI rate and caregiver knowledge data. Lastly, with the video only being offered in English and with the diverse population seen on the unit, many caregivers were excluded from the project because they primarily spoke a language other than English, limiting the number of potential participants.

Related Findings to Current Research

Current literature emphasizes that CVAD and CLABSI education for caregivers of patients with CVADs improves knowledge and confidence while impacting CLABSI rates (Chamblee & Miles, 2021; Pierik et al., 2021; Raybin et al., 2019; Suttle et al., 2019). Similarly, this project supported previous findings that incorporating education positively impacts caregiver knowledge of CVAD care and CLABSI prevention.

Recommendations for Future Research

When continuing the efforts made in this project, future studies should consider having a larger sample size to see if there is any influence on CLABSI rates. Additionally, future studies should have a longer period of intervention implementation. Other considerations should include creating different educational videos for each type of CVAD to better personalize the education

to each caregiver and have these educational videos available in languages besides English.

Lastly, future studies should consider including monitoring adherence with infection prevention bundles as another outcome. Adherence with infection prevention bundles is another important outcome to measure, as it can help determine if the educational video impacts the participation rates in infection prevention strategies.

Conclusion

Despite previous efforts on CLABSI prevention, CLABSI rates remain an ongoing problem within the healthcare system. The prior focus on this issue involved infection prevention bundles. However, current research supports focusing on caregiver education to increase knowledge regarding CVAD, with the potential to influence CLABSI rates. The creation and implementation of this project support the findings that education for caregivers can improve caregiver knowledge related to CVAD care and CLABSI prevention strategies. However, future research is needed to determine if this educational video can influence CLABSI rates and infection prevention bundle adherence. Given the potential of this intervention, more institutions should consider incorporating an educational video for caregivers of patients with CVADs to address the ongoing issue of hospital-acquired CLABSIs nationwide. In turn, there will be a potential to decrease healthcare-related costs and positively impact pediatric healthcare systems.

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Woods-Hill, C. Z., Papili, K., Nelson, E., Lipinski, K., Shea, J., Beidas, R., & Lane-Fall, M.

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<https://doi.org/10.1016/j.ajic.2020.08.019>

Appendix A

Evaluation and Synthesis Tables

Table A1

Evaluation Table for Quantitative Studies

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Suttle et al. (2019), Central line care: Empowering patients to prevent infection and injury via EPIC² Country: United States Funding: None stated Bias: None stated	Theory of Planned Behavior	Design: Pre- /Postintervention Study Purpose: To evaluate the effectiveness of including patient engagement and empowerment in CL care	N= 85 Demographics: All patients on the hematology-oncology specialty unit with CLs Setting: Inpatient hematology- oncology specialty unit Exclusion: Language barriers Altered mental status Cognitive delays Attrition: 34% of participants were unable to be contacted, discharged to another facility, or died	IV1: EPIC² Intervention bundle DV1: CLABSI DV2: Patient feedback Definitions: Central line- associated bloodstream infections Patient empowerment EPIC² Healthcare associated infections	Tools: CLABSI data/rates Validity/ Reliability: CLABSI rates calculated per CDC's definition for numerators and denominators	Statistical Tests Used: None	DV1: 43% reduction in the average CLABSI rate DV2: 96% of patients reported positive feelings of empowerment	Level of Evidence: Level 6 Strengths: Provided direct measure of the effect of intervention, detailed discussion of EPIC² bundle Weakness: Small population size, Single-site setting, Short duration of project (3 months), Inability to interview all participants Conclusions: The EPIC2 project was effective in educating and empowering patients to advocate for optimal care of their CLs Feasibility: Project is low- budget and can be replicated on other hematology/oncology units

Key: **CL** Central Line, **CVC** Central Venous Catheter, **CLABSI** Central Line Associated Bloodstream Infections, **LOS** Length of Stay, **DV** Dependent Variable, **IV** Independent Variable, **MANOVA** Multivariate Analysis of Variance, **MANCOVA** Multivariate Analysis of Covariance, **IF** Intestinal Failure, **PN** Parental Nutrition, **CVAD** Central Venous Access Device, **IVS** Instructional Video Series

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Hicks et al. (2018), Group style venous central catheter education using the GLAD Model Country: United States Funding: None stated Bias: None stated	King's Conceptual System	Design: Pre-/Postintervention Study Purpose: To assess the effects group-based CVC education will have on knowledge, skill, and comfort of caregivers, LOS related to initial CVC placement, and 30-day return hospital visits for CLABSI.	N= 105 Demographics: <u>Age:</u> Mean 39.8 75 Female, 30 Male <u>Number of children in home:</u> 1: 54% 2-3 children: 30% >3 children: 31% <u>Parent education level:</u> HS diploma/GED 16% Some college 27.80% Bachelor's degree 36% Post-graduate 17% <u>Marital status:</u> Single 10.20% Married 66.70% Divorced/separated 16.70% Setting: Inpatient and outpatient from all areas of hospital (NICU, oncology, cardiology, GI, surgical/medical, etc.) Exclusion: Caregivers of children with implanted ports who did not need to learn CVC care. Parents that did submit the demographic/data collection forms. Attrition: None stated	IV1: GLAD model education DV1: Caregiver skill, knowledge, & comfort DV2: LOS related to initial placement of CVC DV3: 30-day return hospital visit for CLABSI Definitions: Central venous catheter Group-based Central line associated blood stream infection Length of stay Readmission	Tools: The Comfort Survey Demographic survey Experience Measures Validity/ Reliability: Games-Howell procedure Bonferroni correction	Statistical Tests Used: MANCOVA MANOVA	DV1: Results indicated a significant increase ($M = 0.49$, $SD = 0.79$), $t(92) = 6.05$, $p = 0.001$, $d = -0.62$) for a total comfort score for the pre- and the post 2 (1 month after) and pre-with post 3 (2 months after) DV2: LOS related to initial CVC placement went from an average 29.7 days to 27.7days DV3: 12 30-day return hospital visit related to CLABSI compared to zero after implementation of the GLAD Model	Level of Evidence: Level 6 Strengths: Provided direct measure of the effect of intervention, detailed discussion of GLAD education Weakness: Randomization not used; Short timeframe (6 months) Conclusions: Caregivers gained increased knowledge, and comfort of CVC care from the GLAD Model Feasibility: The GLAD model can be applied to other medical technologies such as tracheostomy, ventilator care, etc.

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Pierik et al. (2021), Use of instructional videos to reduce central venous catheter complications in children with intestinal failure receiving home parental nutrition Country: Canada Funding: None stated Bias: None stated	Not stated, inferred to be Theory of Planned Behavior	Design: Pre-/Postintervention Study Purpose: To assess the utility of an educational video series and if it could lead to fewer CVC complications at home	N= 14 Demographics: Families of children with IF and receiving home PN with past CVC care and home PN teaching program between 2013-2018 Setting: Patient's home. Participants were emailed link to video series Exclusion: None stated Attrition: None stated	IV1: IVS DV1: Breakage rate DV2: Occlusion rate DV3: Infection rate DV4: Caregiver confidence Definitions: CVC IF PN Patient education Caregivers	Tools: Confidence surveys Validity/ Reliability: GraphPad Prism	Statistical Tests Used: Welch t-test analysis	DV1: $p=0.159$ DV2: $p=0.602$ DV3: $p=0.066$ DV4: 70% of caregivers reported feeling confident 30% reported feeling somewhat confident	Level of Evidence: Level 6 Strengths: Cost-effective intervention; Provided direct measure of the effect of intervention, detailed discussion of instructional video series Weakness: Small sample size; Lack of data collected on gender, race, age of caregivers; Some data could have been missed if participants presented to an other hospital with a CVC complication; Caregivers received video series after initial training and discharge Conclusions: The addition of IVS for caregiver training for CVC care is useful and well-received by caregivers. Feasibility: Instructional videos can be used at any facility and applied to a variety of diagnoses.

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Citation	Theoretical/Conceptual Framework	Design/Method/Purpose	Sample/Setting	Variables	Measurement/Instrumentation	Data Analysis	Results/Findings	Level of Evidence; Application to practice; Generalization
Raybin et al. (2019), CVAD homecare management: Investigating the use of digital education tool during nurse-delivered instruction to parents for new central lines in children with cancer Country: United States Funding: Montgomery was supported by funding from the Alex's Lemonade Stand Foundation Bias: None stated	Not stated inferred to be Health Belief Model	Design: Two-group, post-test-only, randomized experimental design Purpose: To determine whether the use of a DVD education intervention decreased complications with CVCs and enhanced parent education for homecare of CVADs for pediatric patients with cancer.	N= 54 Demographics: <u>Mean Age (months):</u> EG: 76 CG:81.9 <u>LOH after line placement:</u> EG:8 CG:8.1 <u>Gender:</u> Males in EG: 21 Males in CG: 13 Females in EG: 12 Females in CG: 8 Treatment type: Chemotherapy EG: 19 Chemotherapy CG: 10 Radiation EG: 12 Radiation CG: 5 Other EG: 18 Other CG: 16 Homecare nursing EG: 19 Homecare nursing CG: 9 No homecare nursing EG: 14 No homecare nursing CG: 10 Setting: Inpatient hematology-oncology specialty unit Exclusion: Having prior experience with an external catheter. Attrition: None stated	IV1: DVD and standard CVAD education DV1: Infection rates DV2: Clotting rates DV3: CVAD failure DV4: Participant proficiency DV5: Participant satisfaction Definitions: Vascular access device Patient education Pediatric oncology CLABSI	Tools: Caregiver Satisfaction Questionnaire Caregiver Proficiency Test Validity/Reliability: Chi-squared test Fisher's exact test	Statistical Tests Used: Sample t-test procedures	DV1: p=0.7134 DV2: p=0.0507 DV3: equivalent between both groups DV4: p=0.2326 DV5: p=0.0757	Level of Evidence: Level 2 Strengths: Provided direct measure of the effect of intervention, detailed discussion of DVD and standard CVAD education; Assessed how many caregivers had DVD players Weakness: Small sample size; Changes in CVAD standards; Failure to screen for ownership of DVD players; Data collection at single site; Lack of data collected on gender, race, age of caregivers Conclusions: Providing digital caregiver education on home management of CVAD is cost-effective and can reduce burden at home. Feasibility: Could be performed in future using newer technologies such as QR scan codes

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Altounji, et al. (2020), Decreasing central line-associated bloodstream infections acquired in the home setting among pediatric oncology patients Country: United States Funding: None Bias: None	Bandura's social cognitive theory	Design: Pre-/Postintervention Study Purpose: To examine whether a caregiver competency checklist can affect CLABSI rates.	N= 109 Demographics: Patients with a cancer diagnosis requiring CVC for treatment, with a caregiver present to receive education Setting: Inpatient hematology/oncology units at CHLA Exclusion: None stated Attrition: 26% of patients did not receive the intervention	IV1: Caregiver competency checklist DV1: CLABSI Definitions: Pediatric oncology CLABSI CVC Home care	Tools: None stated Validity/Reliability: Fisher's exact test	Statistical Tests Used: Fisher's exact test	DV1: The rate of CLABSI was more prevalent in the preintervention group; 2.23 times greater for MBI-LCBI and 4.52 times greater for non-MBI-LCBI.	Level of Evidence: Level 6 Strengths: Adequate sample size, Directly measured CLABSI rates, Detailed discussion of caregiver competency checklist Weakness: Difficulty calculating outpatient to inpatient CLABSI rates, absence of patient demographics description, not all participants received the intervention Feasibility: Given the high amount of training caregivers must undergo by nurses this may not be replicable for all environments Application: This project can be applied to various diagnosis but using caregiver education as tool to prevent infection

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Chamblee et al. (2021), A prospective study of family engagement for prevention of central line-associated bloodstream infections Country: United States Funding: None stated Bias: None stated	Not stated, inferred to be Theory of Planned Behavior	Design: Prospective Quasi-experimental study Purpose: To examine if a family-centered care handout intervention would affect parental perceptions and increase staff compliance with CLABSI bundle	N= 121 Baseline=59 Intervention=62 Demographics: English speaking, admitted to the PICU with a CVC in place for at least 24 hours Setting: pediatric intensive care unit Exclusion: Imminent death, removal of CVC Attrition: Six parents declined to participate	IV1: Family engagement handout DV1: CLABSI Bundle compliance DV2: Survey results Definitions: Family-centered care CLABSI family engagement CVC	Tools: Supplemental Digital Content 1 (18-item survey) Validity/Reliability: Patient Experienced Officer to provide feedback about questionnaire content Cronbach's alpha	Statistical Tests Used: Wilcoxon Rank Sum Chi-square test GraphPad Prism	DV1: Compliance increased from 89% during the baseline to 94% in the intervention stage DV2: P<0.001	Level of Evidence: Level 3 Strengths: Cost-effective, can be generalized to other issues, directly measured CLABSI bundle compliance Weakness: Single site, only English-speaking participants, short time frame, lack of measurement of CLABSI rates, small sample size, did not consider staff/patient ratios Conclusions: Providing parents CLABSI prevention education is associated with improved parental know and improved perceptions of engagement. Feasibility: Providing caregivers with face-face education is feasible in the acute care setting.

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentati on	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Patton et al. (2019), Standardize, engage, and collaborate: An initiative to reduce community acquired central line blood stream infections across the continuum of care Country: United States Funding: None stated Bias: None stated	Not stated inferred to be Health Belief Model	Design: Pre-/Postinterventi on Study Purpose: To standardize and develop organizational processes to reduce community acquired CLABSI.	N= not explicitly stated, facility capacity 616 beds Demographics: hematology/oncology, gastroenterology/solid organ transplant, nephrology, pulmonology, cardiology, and general pediatrics Setting: inpatient setting Exclusion: Patients without a CVC Attrition: none stated	IV1: Resource booklet and screening tool DV1: CLABSI rates DV2: Home healthy agency tracking DV3: Ability to determine risk factors for CLABSI Definitions: CLABSI blood stream infections home health home care	Tools: Community acquired CLABSI resource booklet Community acquired CLABSI Questionnaire Community acquired CLABSI screening tool Validity/ Reliability: Not stated	Statistica l Tests Used: Not stated	DV1: 30% reduction in CLABSI DV2: out of 18 infections 8 different agencies were identified DV3: Screening tool proactively mitigated complicating for 61 patients	Level of Evidence: Level 6 Strengths: Directly assess CLABSI rates, risk factors and caregiver needs, generalizable Weakness: Lack of discussion of validity and data analysis tools, lack of discussion of demographics and sample size, too broad of setting Conclusions: Utilization go CLABSI reduction strategies can decreased CLABSI and avoid extra healthcare charges. Feasibility: Given the bandwidth needed to implement all parts of the intervention and track trends among home health company this may not be feasible for all institutions.

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Santos et al. (2019), Multi-level intervention program – a quality improvement initiative to decrease central line-associated bloodstream infections in the pediatric acute and hematology/oncology units Country: United States Funding: None stated Bias: None stated	Not stated, inferred to be Theory of Planned Behavior	Design: Pre-/Post multi-level intervention Study spanning 5 years Purpose: To assess adherence to intervention components and assess rates of CLABSI over the span of five years.	N= not explicitly stated Demographics: pediatric patients on a hematology/oncology unit Setting: Acute care hematology and oncology pediatric unit Exclusion: Patients without a CVC Attrition: None stated	IV1: multi-intervention CLABSI prevention program DV1: CLABSI rates DV2: Staff adherence DV3: Patient/family member adherence Definitions: Quality improvement CLABSI CVC bundle	Tools: CVC Audit sheet Parent education roadmap Validity/ Reliability: Not stated	Statistical Tests Used: Not stated	DV1: A decrease from 41 to 9 CLABSI in a year after implementation DV2: staff adherence rates increased DV3: Patient/family adherence rates decreased	Level of Evidence: level 6 Strengths: Longitudinal study, Directly assessed CLABSI rates, extensive research into best practices for intervention pieces Weakness: Lack of discussion of validity and data analysis tools, lack of discussion of demographics and sample size, no discussion of limitations Conclusion: A multi-level intervention program with focus on staff adherence and education can decreased CLABSI rates. Feasibility: Can be repeated and applied to other units but requires a lot of resource and time to implement.

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Table A2
Evaluation Table for Qualitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method/ Sampling	Sample/ Setting	Major Themes Studied/ Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Themes	Level/ Quality of Evidence; Decision for/ Application to practice; Generalization
Soto et al. (2022), Families' experiences of central-line infection in children: A qualitative study Country: United Kingdom Funding: Soto was supported by a Wellcome Trust Senior Investigator award. Dixon-Woods was supported by the Health Foundation's grant to the University of Cambridge for the Healthcare Improvement Studies Institute. Bias: None stated	Not stated, inferred to be Uncertainty in Illness Theory	Design: Qualitative modified grounded theory Method: Semi-structured interviews with parents and children Purpose: To better understand families' views and experiences of CLABSI	N=11 Demographics: Caregivers of children with a child aged 4-12 years with a CVAD for last 3 months and living in the home 4 fathers 9 mothers Mean age of child: Setting: Face-to-face interviews in the families' homes Attrition: None stated	Concept 1: Fear and uncertainty Concept 2: Guilt and responsibility Concept 3: Disruption to normal life Definitions: Infection prevention and control	Data Collection: Interviews collected in the family home lasting between 40 min and 2 hours. Data Dependability: Interviews were digitally recorded and transcribed	Key concepts were identified, and codes were applied to each section of transcribed data. Codes were organized into a structured coding tree using NVivo software and free writing to generate codes into theories. Theoretical saturation was reached before the final interview was conducted.	(1) Constant fear that child will acquire infection. Constant stress, anxiety, and loss of control during potential hospitalizations for CLABSI treatment/CVAD removal. (2) Feeling responsible in event of CLABSI for potentially not providing adequate care. (3) Attempts to retain normal life affected by CLABSI, and efforts to prevent infection by limiting travel and child's activities. Missing school/work due to hospitalizations.	Level of Evidence: Level 6 Strengths: Discussed the significant impact the threat of CLABSI can have the emotional burdens experienced by families. Weakness: Children's experiences were not included; Did not include other family members (i.e., siblings, grandparents); Small sample size Conclusion: Advances in services are needed to support caregivers and children living with the risk of CLABSI. Feasibility: This study can be generalized for other medical devices to assess caregivers feelings and experiences.

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Citation	Theory/ Conceptual Framework	Design/ Method/ Sampling	Sample/ Setting	Major Themes Studied/ Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Themes	Level/ Quality of Evidence; Decision for/ Application to practice; Generalization
Sollazzo et al. (2021), How to improve educational behaviors for caregivers and patients having central venous access device (CVAD): A scoping review Country: Italy Funding: None stated Bias: None stated	Five-stage framework outline by Arkey and O'Malley	Design: Systematic review Method: Documentary evaluation of international databases Purpose: To identify literature concerning education interventions to promote patient's action to overcome CVAD issues.	Sample: 19 research articles Demographics: Publication dates of January 2002-July 2019 Articles addressing adult patients with CVAD and/or caregivers. observational, experimental, quasi-experimental, qualitative studies and theoretical and opinion papers Languages of English, Spanish, Italian	RQ1: Identify the research question RQ2: Identify the relevant studies RQ3: Collect summarize and report the results Definitions: CVAD patient education CLABSI Family-involved care Caregivers' education self-care self-management	Data Collection: Systematic search on PubMed, CINAHL, Scopus, and Cochrane Library Data Dependability: Phase 1: titles and abstracts read independently by two members of the research team Phase 2: Reference software used to indicate if citations were relevant, duplicates, irrelevant or unrelated studies removed Discrepancies were solved by discussion and all inclusion criteria must be met	State type used: Qualitative data synthesis	(1) Population: adult/pediatric patients with CVC and/or caregivers Concept: educational interventions Context: medium/long-term CVC patients in hospital/outpatient/home (2) 4 descriptive studies; 3 quasi-experimental; 3 non-experimental analytical, 2 RCTs, 2 surveys; 2 educational projects; 1 mix-method study; 1 pilot study and 1 case report (3) Use of different media including brochures, information videos, tablets, or DVDs	Level of Evidence: level 1 Strengths: First comprehensive review to include education intervention related to CVAD care, used a variety of databases, strict inclusion criteria Weakness: High risk of bias with this type of study, timespan over the last 5 years Conclusions: Focus on education can influence patient safety and standards of patient care.

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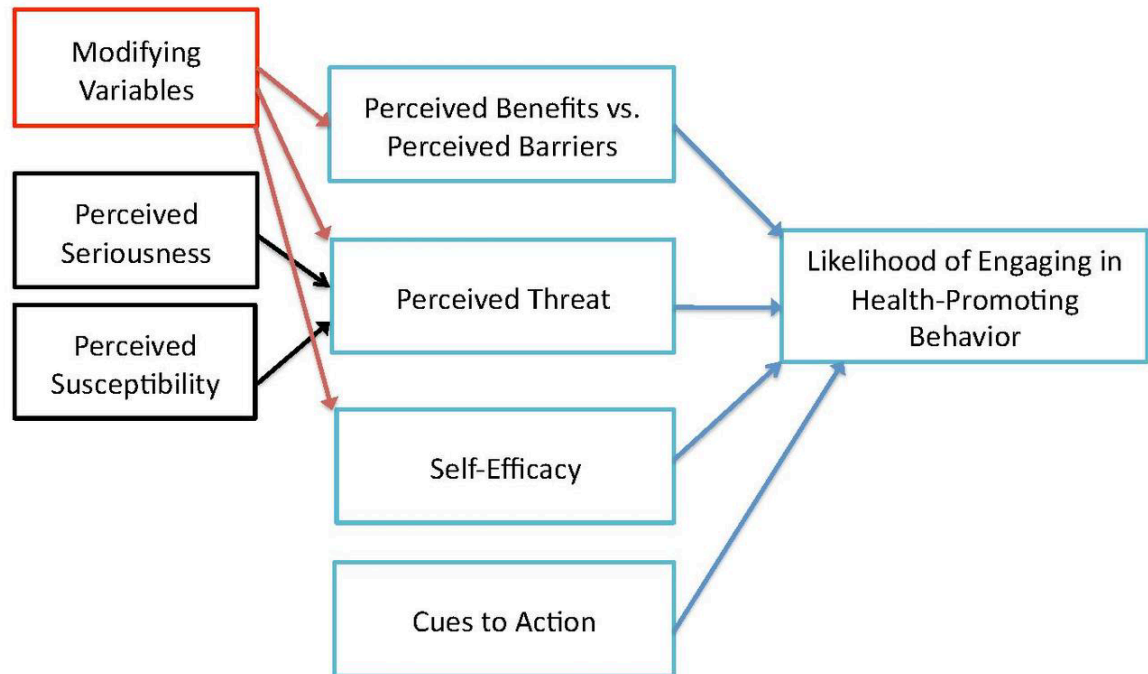
Table A3
Synthesis Table

STUDIES		Suttle et al.	Hicks et al.	Pierik et al.	Raybin et al.	Altounji et al.	Chamblee et al.	Patton et al.	Santos et al.	Soto et al.	Sollazzo et al.
BASICS	Year	2019	2018	2021	2019	2020	2021	2019	2019	2022	2021
	Design	PPI	PPI	PPI	RCT	PPI	PQE	PPI	PPI	QMGT	SR
	LOE	IV	IV	IV	II	IV	III	IV	IV	IV	I
	Participants	Adults	Pediatrics	Pediatrics	Pediatrics	Pediatrics	Pediatrics	Pediatrics	Pediatrics	Pediatrics	Pediatrics
	Setting	Inpatient	Inpatient/Outpatient	Outpatient	Inpatient	Inpatient	Inpatient	Inpatient	Inpatient	Outpatient	Inpatient/Outpatient
	Theory/Framework	TPB	KCS	TPB	HBM	BSCT	TPB	HBM	TPB	UIT	FSTFO
INTERVENTIONS	Video	X		X	X				X		X
	Group learning		X						X		
	Competency checklist					X					X
	Handout/booklet						X	X	X		X
	Structured interviews									X	
MAJOR FINDINGS	CLABSI rates	↓	↓	↓	=	↓		↓	↓		↓
	Caregiver confidence/skill	↑	↑	↑	↑				↓		↑
	Bundle compliance						↑		↑		↑
	Occlusion rates			↓	↓						↓
	Fear/anxiety with CVC									↑	↓

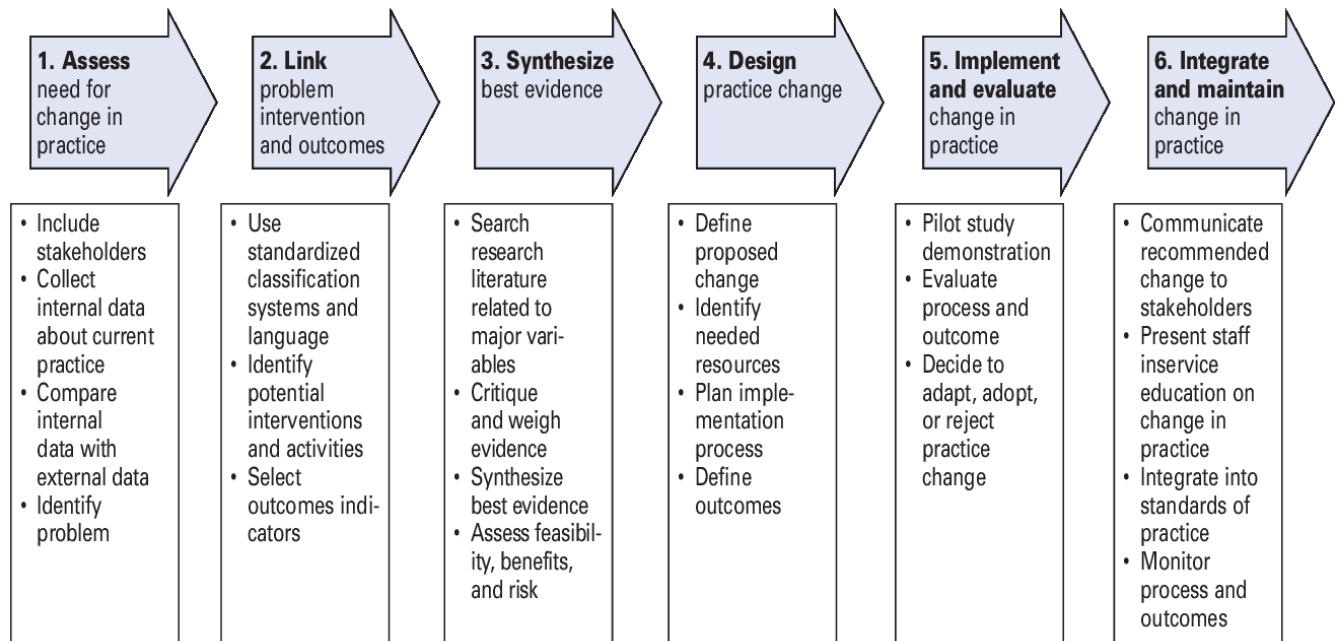
Key: **PPI** Pre-/Postintervention, **RCE** Randomized Posttest Experimental, **PQE** Prospective Quasi-experimental, **QMGT** Qualitative Modified Grounded Theory, **SR** Systematic Review, **TPB** Theory Planned Behavior, **KCS** King's Conceptual System, **HBM** Health Belief Model, **BSCT** Bandura's Social Cognitive Theory, **UIT** Uncertainty in Illness Theory, **FSFO** Five-stage Framework Outline, **CLABSI** Central Line Bloodstream Infection, **CVC** Central Venous Catheter, ↑ Increase, ↓ Decrease, = No Change

Appendix B**Models and Frameworks**

Figure B1
Health Belief Model



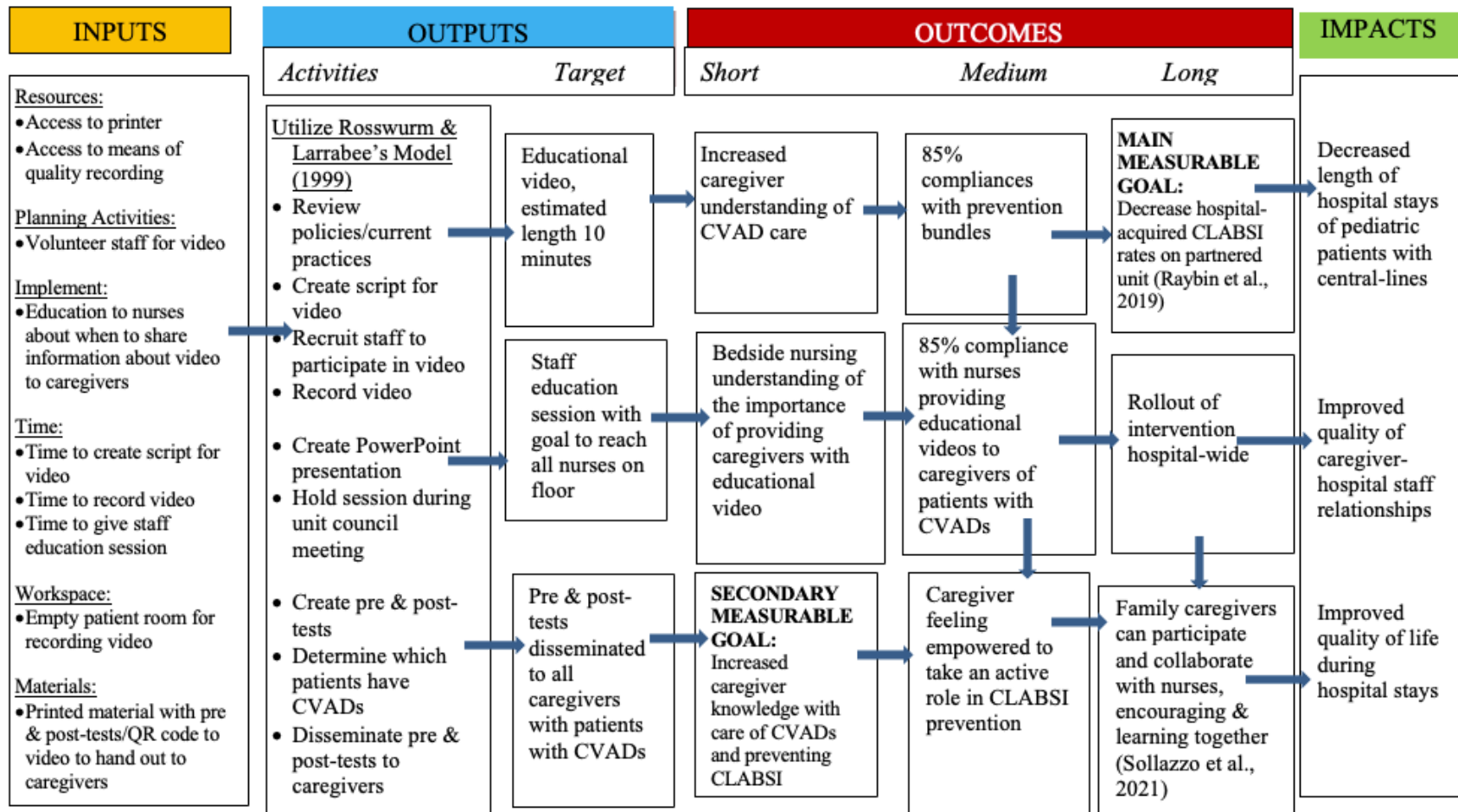
(Shea et al., 2019)

Figure B2*Rosswurm and Larrabee's Model for Evidence-based Practice*

(Rosswurm & Larrabee, 1999)

Figure B3
Logic Model

Goals: Better integrate caregiver role in central-line care and infection prevention practices; Decreased CLABSI rates; Increased CLABSI bundle compliance. The purpose of completing this project is to help caregivers better understand the implications that having a central line can have and empower them to take an active role in preventing CLABSIs.



Assumptions: Stakeholders will see value in project and provide resources to create an educational video. Stakeholders will recognize the need for this project and discuss what information is most important to include in education; according to Raybin et al. (2019), content for their video was developed by physicians, nurse practitioners and nurses. Bedside RNs will be willing to provide caregivers with link to education video and ensure it is given to every caregiver of a child with a new central-line. Caregivers will be receptive and open to learning how to prevent CLABSI in their child; according to Pierik et al. (2021), when caregivers were asked about the potential usefulness of instructional videos, 9 out of 14 families reported they would find them useful. Caregivers will watch educational video once provided with link; in their study all caregivers reported having viewed at least one of the videos (Pierik et al., 2021).

Appendix C

Project Materials and Budget

Image C1
Project Flyer



Image C2
Pre-Intervention Test

Empowering Caregivers: A Proactive Approach to Preventing CLABSI

LETTER OF CONSENT

Dear Parent:

I am a graduate student in the Edson College of Nursing and Health Innovation at Arizona State University under the direction of Professor Danielle Sebbens. I am conducting a quality improvement (QI) project to determine whether educating caregivers about central-line care can influence rates of central-line bloodstream infections.

I am inviting you to participate, which will involve only you, the caregiver, watching an educational video, which takes approximately 3 minutes, and taking a pre-and post-test to assess your knowledge of the subject matter, which will take approximately 4 minutes.

Your participation in this study is voluntary,

Caregivers: A Proactive Approach to Preventing CLABSI

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[Learn more](#)

* Indicates required question

What are the first two letters of your mother's last name and the last two digits of your phone number? *

Your answer

Why do we place and use central lines? *

- ☐ Decrease IV pokes
- ☐ Irritating medication infusions
- ☐ Frequent lab draws
- ☐ Administer nutrition
- ☐ All of the above

What is a central line bloodstream infection (CLABSI)? *

- ☐ When germs or bacteria get into the urine
- ☐ When germs or bacteria get into the stool
- ☐ When germs or bacteria get into the blood
- ☐ When your child has a cold

Which is a sign of a CLABSI? *

- ☐ Cough and congestion
- ☐ A temperature above 101°F (38.3°C) by mouth on time or a temperature higher than 100.4°F (38°C) two times in an hour
- ☐ Throwing up or vomiting
- ☐ All of the above

What should your child complete every day while in the hospital? *

- ☐ All of the above

What should your child complete every day while in the hospital? *

- ☐ Bath or shower with CHG wipes once a day
- ☐ Brush teeth twice a day
- ☐ Rinse mouth with oral rinse three times a day
- ☐ All of the above

What is the best way to prevent infections? *

- ☐ Good handwashing
- ☐ Teeth brushing
- ☐ Staying in the room
- ☐ Wearing a mask

Empowering Caregivers: A Proactive Approach to Preventing CLABSI

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[Learn more](#)

Thank you for participating in the pre-test! Click submit and next, please watch the Central Line education video.

[Back](#) [Submit](#) [Clear form](#)

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Image C3
Post-Intervention Test

Empowering Caregivers: A Proactive Approach to Preventing CLABSI

PostTest

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* Indicates required question

Caregiver Education Survey: PostTest

What are the first two letters of your mother's last name and the last two digits of your phone number? *

Your answer

Why do we place and use central lines? *

- ☐ Decrease IV pokes
- ☐ Irritating medication infusions
- ☐ Frequent lab draws
- ☐ Administer nutrition
- ☐ All of the above

What is a central line bloodstream infection (CLABSI)? *

- ☐ When germs or bacteria get into the urine
- ☐ When germs or bacteria get into the stool
- ☐ When germs or bacteria get into the blood
- ☐ When your child has a cold

Which is a sign of a CLABSI? *

- ☐ Cough and congestion
- ☐ A temperature above 101°F (38.3°C) by mouth on time or a temperature higher than 100.4°F (38°C) two times in an hour
- ☐ Throwing up or vomiting
- ☐ All of the above

What should your child complete every day while in the hospital? *

- ☐ Bath or shower with CHG wipes once a day
- ☐ Brush teeth twice a day
- ☐ Rinse mouth with oral rinse three times a day
- ☐ All of the above

What is the best way to prevent infections? *

- ☐ Good handwashing
- ☐ Teeth brushing
- ☐ Staying in the room
- ☐ Wearing a mask

Please share any suggestions for changes to the education.

Your answer

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Thank you for participating in this project! Don't forget to click submit.

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Table C4
Proposed Budget

Potential Funding: Phoenix Children’s Hospital Family Advisory Council, Phoenix Children’s Hospital CLABSI HAC Team, American Academy of Pediatrics, National Association of Pediatric Nurse Practitioners

Revenue/Savings: Proper care of central venous access devices (CVADs) can prevent healthcare-acquired central line bloodstream infections (CLABSIs), reducing adverse patient events and decreasing hospitalization. The average cost of one CLABSI is \$48,108, and in 2023, the hematology/oncology unit at the partnered hospital had 22 CLABSIs, costing an average total of \$1,058,376. If this project can reduce CLABSIs by 50%, there is potential for an estimated \$529,188 in savings.

Expenses				
PHASE	ACTIVITIES	COSTS	SUBTOTAL	TOTAL
PREPARATION	Direct Costs			
	Design and develop CVAD educational video (video camera, computer, and time of site champion); estimated 3 hours at average \$40.97/hour	\$122.91		
	Design and develop PowerPoint presentation for bedside nursing education (computer and time of site champion); estimated 2 hours at average \$40.97/hour	\$81.94		
	Design and develop online pre- and post-test (computer and time of faculty for face validity); estimated 2 hours at average \$45/hour	\$90		
	Design and develop flyers with QR codes for pre-and post-tests and to video link	\$50		

	Print flyers-200 copies of each at \$0.12 each	\$24	\$368.85	
	Indirect Costs			
	Meetings with site champion; estimated 5 hours at average \$40.97/hour	\$204.85		
	Meetings with project mentor; estimated 10 hours at average \$45/hour	\$450		
DELIVERY	Direct Costs			
	Light refreshments and snacks for nurses during education session at unit-based council meeting	\$75		
	Indirect Costs			
	Rented conference room for unit-based meeting for education day; estimated 1 hour at average \$115/hour	\$115		
	Education to bedside nurses while on shift; estimated 1-hour, average RN hourly wage \$35 x75 nurses	\$2,625		
	Caregiver time during intervention to complete pre- and post-tests and watch video	\$0	\$2,711	
EVALUATION	Direct Costs			
	Intellectus statistical software	\$0		
	Review and analysis of results (\$20/hour x 10 hours)	\$200	\$200	\$3,279.85

Appendix D

Outcomes

Figure D1
CLABSI Rates on Unit Pre-Intervention, During Intervention, and Post-Intervention

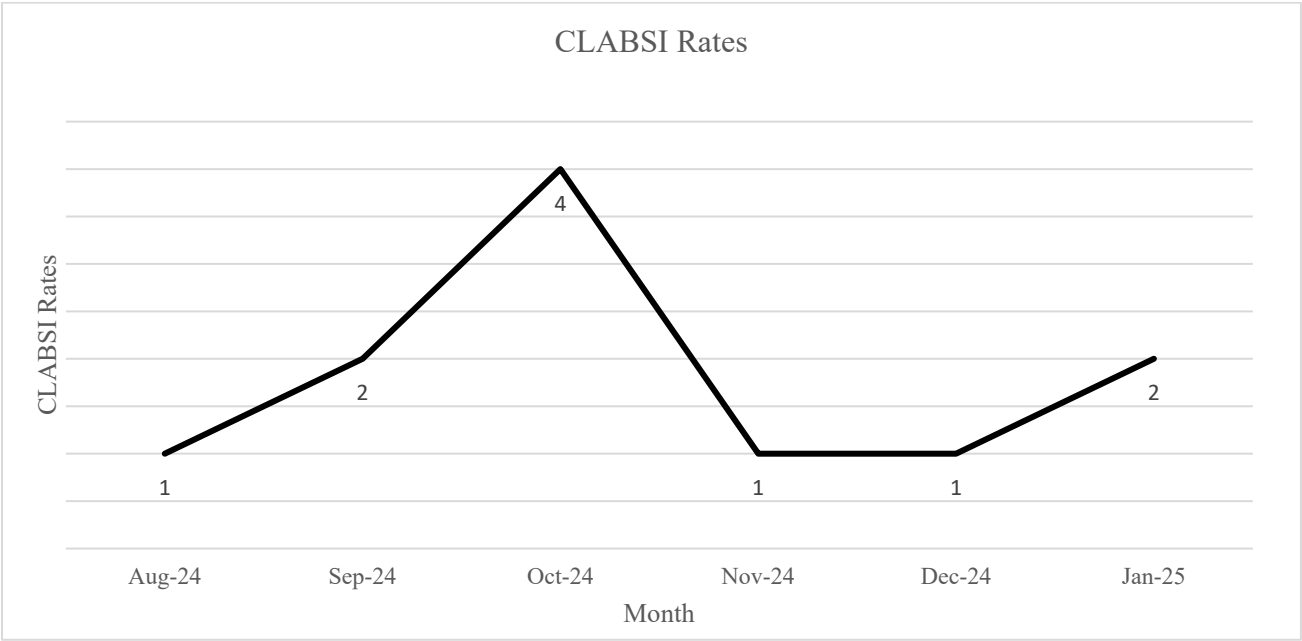


Table D2
Summary Statistics Table for Difference in Pre-Intervention and Post-Intervention Knowledge

	<i>M</i>	<i>SD</i>	Min	Max
Pre-Intervention	3.88	0.62	3.00	5.00
Post-Intervention	4.75	0.45	4.00	5.00

Note. N=16.