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Blood Stream Infections Related to Hemodialysis Catheter Use

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This is to certify that the doctoral study by

Patricia Goodman

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Walden University
2022

Abstract

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MSN, Walden University, 2017

BSN, Grand Canyon, 2015

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

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Abstract

Hemodialysis is a life-sustaining procedure for patients diagnosed with end-stage renal failure. Most of these patients initiate hemodialysis with a tunneled central venous catheter, with some depending on its use for long-term treatment due to poor vascularity. Catheter-related bloodstream infections in hemodialysis patients are a complication of hemodialysis catheter use with a high morbidity and mortality rate. A quality improvement (QI) project was conducted to answer the practice-focused question of whether the use of chlorhexidine swabs and caps for central venous catheter dressing changes decreased the rate of hemodialysis catheter-related bloodstream infections. Resolution to this problem would benefit the patient, the state-funded Medicare and Medicaid Services, and the hemodialysis facility. A retrospective analysis using Lewin's change theory was used to conduct the QI evaluation project. Three months of pre- and post chlorhexidine intervention data were analyzed. The analyzed data from 70 patients were obtained from the hemodialysis facility's infection control department and included a comparison to the standardized infection ratio. Three months prior to the implementation of chlorhexidine there were five infections, and three months post implementation of the chlorhexidine there was only one. The recommendation based on the evaluation findings is that a protocol including guidelines for chlorhexidine use be established, followed by the implementation of annual staff competencies. This will impact positive social change by decreasing the rate of hemodialysis catheter-related bloodstream infections and subsequent morbidity and mortality at this hemodialysis facility and can also be used at other facilities.

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Dedication

It is almost impossible to find words to extend my gratitude to my daughter, Jonelle, and my life partner, Vibert, for their encouragement and support throughout this academic journey. To my grandchildren, Connor, and Kendall, you motivated me to be all you think I am, believing I am invincible. In dedication to my brother, Shawn, who was my mentor and friend and was taken from this world too soon.

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Dr. Flynn, you were my mentor for 35 years, and I am proud to be able to follow in your footsteps. Dr. Thompson and Yvette, your role in my life is immeasurable. God placed each one of you in my path for a specific purpose. Much thanks to you all.

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Section 1: Nature of the Project

Introduction

End-stage renal disease (ESRD) is a chronic life-threatening disease with high morbidity and mortality rates that is accelerated by the high prevalence of hypertension and diabetes. Patients with ESRD depends on hemodialysis, peritoneal dialysis, or kidney transplant for sustained life (John Hopkins Medicine, 2021). According to the University of California, San Francisco (2018), 750,000 individuals in the United States are diagnosed with kidney failure annually. As of 2019, the United States ranked among the highest for ESRD in the world (Sawni, 2019). Once accepted and placed on the kidney transplant list, the wait time is approximately 3-5 years or longer in some areas of the country (National Kidney Foundation, 2021). An estimated 100,000 patients were on a transplant list with only 21,000 anticipated donors as of 2019 (Longino, 2019). Care for this population accounted for 7%, or $35 billion, of the Medicare budget in 2016 (University of California San Francisco, 2019). The reported cost annually for transplanted patient care to the Medicare system without other insurance coverage is $3.4 billion (Zarefsky, 2020). This estimate does not include the cost of infections and hospitalization that is a common occurrence among the ESRD population. ESRD has societal impacts in addition to affecting the patient and the family members who support them and provides care and transportation to and from treatment. According to a report from the World Health Organization, kidney failure is a neglected chronic disease that has a greater effect on persons of low socioeconomic status (Luyckx et al., 2018).

ESRD is a chronic disease that is characterized by infections and hospitalizations due to fluid overload and catheter-related bloodstream infections (CRBSI). An estimated 80% of patients with ESRD in the United States initiate hemodialysis with a tunneled central venous catheter (CVC), and 20% of patients depend on its use for long-term treatment due to poor vascularity (Farrington & Allon, 2019). Hemodialysis treatment is usually anticipated, and the patient is being followed by a nephrologist. In expectation of a further decline in kidney function, doctors surgically install a planned arterial venous fistula or arterial-venous graft. In cases of emergency treatment or poor vascular function, a CVC is used to initiate and sometimes sustain hemodialysis treatments. The CVC places these patients at high risk for CRBSI (Tang et al., 2019). CRBSI is the cause of frequent and lengthy hospital stays and is a sizable financial burden to the healthcare system (Zanoni, 2020). Gram-positive bacteria, with staphylococcus aureus and coagulase-negative staphylococci, are the most common causative pathogens, accounting for 40% to 80% of CRBSIs, and gram-negative organisms are responsible for 20% to 40% (Miller, 2016). CVC infections in hemodialysis patients are associated with high morbidity and mortality rates that can be eradicated with the use of chlorhexidine scrubs and or chlorhexidine caps (Golestaneh & Mokrzycki, 2018). However, research shows that many nurses are resistant to, or unfamiliar with, the use of chlorhexidine scrubs and or caps to lessen the likelihood of CRBSI in hemodialysis patients (Bayoumi & Mahmoud, 2017).

At the facility where this quality improvement (QI) evaluation project was conducted, there was a misconception that the patient's catheter insertion site when cleansed with chlorohexidine causes an allergic reaction, thus creating a decrease in its use. Research shows that, if chlorohexidine is not allowed to dry properly according to the product recommendations, a skin reaction may occur (Australian Society of Clinical Immunology and Allergy, 2019). The skin reaction may easily be misdiagnosed as an allergic reaction (Moka, et al, (2015). According to the staff at the hemodialysis facility this gap in nursing practice most likely, increased CRBSI in the hemodialysis population.

Problem Statement

The hemodialysis facility is a hospital-based, outpatient, off-site, 14-chair facility, with three shifts staffed daily. The facility is located in the state of Maryland. The number of patients with CVCs fluctuates over time. Due to an increase in CRBSI, I implemented a QI initiative to use chlorhexidine in dressing changes and chlorhexidine caps. At the time of the project, the hemodialysis patient population with a CVC was 11; 59 patients had permanent fistulas. The Centers for Medicare and Medicaid Services (CMS) recommends a rate no higher than 12% (Rosenberry, et al., 2018). The population with CVCs at the facility was 15.7%. The rate of CRBSI in this facility was 20 and 60% at 3 and 12 months, respectively, as of 2019-2020, compared to the benchmark of 10 and 50% at 3 and 12 months set by the Kidney Disease Outcomes Quality Initiative (Allon & Sexton, 2020). This Doctor of Nursing Practice (DNP) QI evaluation project was

conducted at the hemodialysis clinic by evaluating existing data on CRBSI rates before and after the QI intervention.

My plan was that if the intervention proved to be effective, the use of chlorhexidine would be continued and if it was ineffective, evidence-based practice (EBP) would be emphasized to be put into practice. The findings of this project may guide this facility and other hemodialysis facilities in the implementation of procedures and products that decrease CRBSI in the hemodialysis population. It also has the potential to improve patient outcomes and provide a better understanding of infection control practices among the hemodialysis staff.

Purpose Statement

The purpose of this DNP evaluation project was to identify whether the QI intervention using chlorhexidine and chlorhexidine caps for central line dressing changes was effective in decreasing CRBSI in hemodialysis patients. The practice-focused question was, Did the use of chlorhexidine and chlorhexidine caps for hemodialysis CVC dressing changes decrease the rate of hemodialysis CRBSI?

Nature of the Doctoral Project

This DNP project was a QI evaluation project, which involved the analysis of pre- and postintervention data to determine the effectiveness of using chlorhexidine and chlorhexidine caps for CVC dressing changes. I collaborated with the hemodialysis unit director, the educator, and the head of the infection control department to guide this project. After obtaining (Walden University Institutional Review Board (IRB) approval),

I reviewed data on CRBSI rates 3 months before and 3 months after the intervention were reviewed to determine whether the QI project intervention was effective in reducing CRBSI for hemodialysis patients. Approval was also obtained from the hemodialysis facility's governing organization. CRBSI was defined by the presence of positive blood cultures. The literature was obtained from sources such as CINAHL, MEDLINE, and John Hopkins University using keywords such as catheter-related bloodstream infections and hemodialysis infections. The literature was reviewed to evaluate best practices related to the prevention of CRBSI and to evaluate whether the interventions utilized by facility personnel align with best practice.

I used a retrospective analysis model with a set of interrelated concepts such as nursing system characteristics, education, patient-centered nursing interventions, and desired outcomes to explain the main concepts and the proposed relationship between chlorhexidine and CRBSI prevention. Lewin's change theory was used to guide the QI intervention evaluation project. In conducting the project, I followed the guidelines in the Walden University (2019) Manual for Quality Improvement Evaluation. The outcomes after the QI intervention were evaluated to see if the QI project was successful at reducing CRBSI rates. I will discuss the findings in Section 4.

Significance

In conducting this DNP project, I sought to identify whether the QI initiative was effective in decreasing CVC infections and, if so, could serve as a foundation for hemodialysis nursing staff to establish and promote EBP. The project may lead to

positive social change. When EBP is effectively used as guide for nursing processes and procedures, patients benefit from improved care and better outcomes (Abu-Baker, et al., 2021). A decrease in CRBSI rates may benefit patients by decreasing their hospitalizations and improving their quality of life and dignity (Bell & O'Grady, 2017). It may positively impact the facility because better CRBSI rates will enable them to report positive outcomes on the CMS website, maintain compliance with the CMS quality measure, and increase financial reimbursement (Centers for Medicare and Medicaid Services, 2022). This publicly reported data can improve patient confidence in the facility.

My plan was that if the QI intervention was found to be effective in lowering CRBSI rates, the intervention would be shared through publication and other means of dissemination so that other dialysis clinics can implement the practices. The stakeholders are the hemodialysis patients who stand to gain from improvements in quality of life, which is negatively impacted by frequent hospitalizations and rehabilitation when a CRBSI occurs (Farrington & Allon, 2019). The hemodialysis facility and insurance companies should benefit financially from the decrease in CRBSI. Hemodialysis facilities are financially reimbursed based on their hospitalizations, infection rates, overall patient care ratings, and compliance with the National Kidney Foundation standards Centers for Medicare and Medicaid Services, (2022). CMS is federally funded and is one of the primary health insurance companies for patients with ESRD. A reduction in infection

rates will potentially create a reduction in hospitalization and rehabilitation, decreasing the monies spent annually on hemodialysis patient treatments for CRBSIs.

Summary

The issue of CVC infections is a population issue that affects the health and maintenance of patients with ESRD. This issue remains of grave concern for nephrologists and the CMS despite the implementation of guidelines and regulations (Farrington & Allon, 2019). As the population ages, the prevalence and incidence of ESRD will increase because of uncontrolled hypertension and Type 2 diabetes. This project may meet the needs of the organization as they are striving to improve quality of care, patient satisfaction, employee satisfaction, and patient outcomes. In this section, I provided an overview of the QI project, which included the problem, purpose, and significance. In Section 2, I will address the local background and context as well as the concepts, models, and theories that underpin the project and the project's relevance to nursing practice.

Section 2: Background and Context

Introduction

Despite the CMS 2004 initiative on fistulas, a CVC is still the mode of hemodialysis for 80% of patients with ESRD (Farrington & Allon, 2019). CRBSIs are the most complex complication for patients with long-term CVC use (Tai, & Yevzlin, 2021). In this doctoral project, I focused on hemodialysis patients with a CVC at a hospitalbased outpatient hemodialysis facility. The facility's director confirmed the necessity for a QI evaluation project, based on the fluctuating incidence of hemodialysis catheterrelated infections at the facility. The rate of CRBSI among the dialysis patients before the QI intervention was 30 and 70% at 3 and 12 months, respectively.

Concepts, Models, and Theories

I used a retrospective analysis model with a set of interrelated concepts such as nursing system characteristics, education, patient-centered nursing interventions, and desired outcomes to explain the main concepts and the proposed relationship between chlorhexidine and preventing CRBSI. I used Lewin's change theory to guide this QI intervention evaluation project. It was helpful in identifying the effectiveness with which the facility was able to modify its processes and policies to bring about a positive change (see Hussain et al., 2018). Assessing the staff's readiness for change and the administration's support of the proposed changes was an important aspect of the QI intervention. Lewin's theory involves unfreezing, implementing change, and then refreezing (Raza, 2019). The unfreezing was done by the infection control director, who

reported that the high incidence of CRBSI was a problem that required educating the leaders and staff. The change was implemented by the hemodialysis director and educator. They identified that chlorhexidine and chlorhexidine caps were a best practice and launched this as an intervention to cleanse CVC insertion sites and help reduce CRBSIs in the dialysis population. Refreezing was done by the manager, educator, and charge nurses who enforced adherence to the implemented change in the catheter dressing procedure. I conducted this QI evaluation project to determine whether the change was effective in producing the desired results of a decrease in CRBSI.

Relevance to Nursing Practice

As members of the most valued and trusted profession, nurses are tasked with providing the best possible care (Carrico et al., 2018). As part of their oath, nurses are obligated to identify and adhere to best practices based on evidence. For this reason, EBP is the foundation for nursing practice and improved patient outcomes (Mackey & Bassendowski, 2017). At the project site, a gap in nursing practice in the procedure for catheter dressing changes was evident by the presence of infection and tracking of the clinicians involved in the patients care two to three treatments prior to the identification of the CRBSI. Some of the techniques I observed did not allow the chlorhexidine to dry or completely disregard its use. This QI project may support the existing evidence that chlorhexidine is effective in controlling CRBSI in the hemodialysis population (Ergo, et al, 2018). The knowledge from the project may contribute to closing the gap in nursing practice. An evaluation of what practices and products are effective in bringing about a

reduction in the incidence of CRBSI may help to decrease morbidity and mortality among the hemodialysis population. The findings and evidence-based recommendations of this project may be instrumental in changing nursing practice not only at the evaluated facility, but at other hemodialysis facilities. I plan to disseminate the findings via Microsoft PowerPoint presentations at staff meetings to educate the attendees.

Local Background and Context

Patients with central line venous catheters are at increased risk for CRBSI (Allon & Sexton, 2022). At the facility where the QI evaluation project was conducted, there was a misconception that the patient's catheter insertion site when cleansed with chlorohexidine causes an allergic reaction, thus creating a decrease in its use. However, according to the literature, it was the technique that was being used that was causing issues. If chlorohexidine is not allowed to dry properly according to the product recommendations a skin reaction may occur that may easily be misdiagnosed as an allergic reaction (Australian Society of Clinical Immunology and Allergy, (2019). This gap in knowledge led to nursing practice that did not involve the consistent use of chlorhexidine and, subsequently, resulted in increased CRBSI in the hemodialysis population. The mission of the facility is to provide safe, high-quality health care. I used Lewin's model to structure the QI evaluation project to provide evidence of chlorhexidine's effectiveness in decreasing and preventing CRBSI in hemodialysis patients with CVCs.

Role of the DNP Student

I have been an employee of this organization for 22 years. I first presented the purpose of the project to the educator for buy-in. In a meeting that I conducted with the educator and administrative staff of the facility, the stakeholders agreed that an evaluation project that focused on the effectiveness of chlorhexidine and chlorhexidine caps in reducing CRBSI might benefit the hemodialysis outpatient facility and the entire healthcare organization. I conducted a retrospective review of data that I obtained from the infection control department to evaluate the effectiveness of the intervention. Data from 3 months prior to the intervention and 3 months after were evaluated. My role was to conduct the QI evaluation and to develop a project that could serve as a model to confirm the effectiveness of following evidence-based nursing practices. I identified no biases and conflicts of interest when conducting this DNP project. I am academically prepared to lead this facility in their fight to eradicate this deadly hemodialysis complication. The findings from this project may yield best practices to prevent CRBSI in hemodialysis patients.

Role of the Project Team

The project team consisted of the hemodialysis educator, the director of the hemodialysis facility, the infection control director, and me as the DNP student. The engagement of a team of stakeholders has been associated with the achievement of goals and objectives towards positive outcomes (Byrne, 2019). I presented the purpose of the project to the educator for buy-in. Afterward, I presented the QI intervention evaluation

project goals and objectives to the team for support. On verbal approval from the director of the hemodialysis facility, I communicated via telephone with the infection control director to obtain initial data about CRBSI rates above the recommended benchmarks of 10% (at 3 months) and 50% (at 12 months) prior to the QI intervention, to provide evidence that an issue existed. The director of the hemodialysis facility was instrumental in looking at the project results that I presented and discussing next steps related to CRBSI prevention.

Summary

Multiple factors contribute to the diagnosis of hemodialysis CRBSI. Of these, the decreased use of chlorhexidine, an evidence-based nursing practice, may be a leading contributor (Bayoumi & Mahmoud, 2017). This QI project provided the opportunity to enhance knowledge and improve practice among staff at the project facility in an effort to lower CRBSIs among patients undergoing hemodialysis. In this section, I addressed the background, concepts and models, relevance to nursing practice, and the role of the DNP student and project team. In Section 3, I will review the sources of evidence for the project along with the plans for analysis and synthesis.

Section 3: Collection and Analysis of Evidence

Introduction

To conduct the QI evaluation project of CRBSIs at the hemodialysis facility, I collaborated with the hemodialysis unit director, the hemodialysis educator, and the director of the infection control department. Data on the CRBSI rates 3 months before and 3 months after the intervention were reviewed after IRB approval to determine whether the QI project intervention was effective in reducing CRBSI for hemodialysis patients. CRBSI was defined by the presence of positive blood cultures with or without symptoms of fever or chills. Increased literature was obtained from additional nursing sources within the hemodialysis facility. I used a retrospective analysis model with a set of interrelated concepts such as nursing system characteristics, education, patientcentered nursing interventions, and desired outcomes to explain the main concepts and the proposed relationship between chlorhexidine and preventing CRBSI. Lewin's change theory of unfreezing, change, and refreezing was used to guide the evaluation of the QI intervention. I conducted the project by following the guidelines in the Walden University (2019) Manual for Quality Improvement Evaluation.

Practice-Focused Questions

I completed a QI project to explore ways to reduce CRBSI for hemodialysis patients. The intervention of using chlorhexidine and chlorhexidine caps was implemented. As part of this DNP project, I evaluated whether the intervention was effective. The practice-focused question was, Did the use of chlorhexidine and

chlorhexidine caps for the use of hemodialysis CVC dressing changes decrease the rate of hemodialysis CRBSI?

Sources of Evidence

I completed a literature review using CINAHL, MEDLINE and search engines using key search terms such as chlorhexidine, hemodialysis catheter-related infections, hemodialysis infections, alcohol and chlorhexidine, hemodialysis central venous catheter, and central line-associated bloodstream infections. Additional information was obtained from the infection control department and hemodialysis facility as necessary. I conducted a review of literature looking specifically at hemodialysis catheter-related infections and the use of chlorhexidine for dressing changes (see Kotwal, et al., 2020). According to researchers, the high incidence of CVC infections in hemodialysis patients and the gap in nursing practice creates physical and emotional stress for the patient and a financial burden on the patient, insurance companies, and the facility (Himmelfarb et al., 2020).The Centers for Disease Control and Prevention (2022) partnered with hemodialysis facilities and stakeholders to form the Making Dialysis Safer for Patients Coalition endorsing the use of chlorhexidine for CVC dressing changes and chlorhexidine caps for the reduction and prevention of CRBSI (Patel & Rainisch, 2018). The gram-positive organism is responsible for 40% to 80% of CRBSI; this organism is usually methicillin-resistant and causes high rates of hospitalization even death, which can be prevented with proper techniques and improved nursing education (Haddadin, et

al., 2021). According to Abdo et al. (2020), nursing knowledge and practices regarding hemodialysis CVC care can prevent the incidence of CRBSI.

Improvement in nursing practice is imperative because interventions such as aseptic technique, peer monitoring, and handwashing have failed to lower CRBSI rates (Centers for Disease Control and Prevention, 2020). I obtained the data for this retrospective qualitative QI evaluation project from the infection control department, which oversees the infection rates, processes, and policies of the different inpatient units and outpatient facilities in the organization. These data are stored and retrieved using the EPIC computerized program. I analyzed the data to determine whether the intervention was effective. If the intervention proved to be effective, it will be recommended that the facility continue with this practice. If it is found not to be effective, other EBPs will be shared with the facility leadership with a recommendation to implement. Increasing nurses' compliance with EBP may improve patients' quality of life, patient satisfaction scores, and staff morale and decrease the financial burden on the facility and state of Maryland. (Engle, et al., 2021).

Analysis and Synthesis

I used a retrospective analysis model to analyze the data that I obtained from the facility's infection control department, after obtaining Walden IRB approval. CRBSI rates 3 months before the QI intervention were compared with rates 3 months after to determine if there was an improvement. According to Allon & Sexton, 2022, when a patient presents with fever, or chills, which are considered the cardinal signs and

symptoms of an infection, the nursing staff obtain blood cultures. If the cultures are obtained from a patient who has a CVC, the infection may be catheter related. Antibiotics are immediately infused to slow the progression of the infection until the result of the blood cultures with sensitivity results are obtained (Allon & Sexton,2022). Staff monitor the collection of all blood cultures by way of the electronic health record system. At this facility, the electronic health record system is Epic. According to the nursing protocol, positive blood cultures obtained from the hemodialysis facility are monitored by the infection control department, and an alarm is then sent to the hemodialysis facility director for management and corrective action. The identification of the involved patient is protected using a medical record number. The hemodialysis director and educator are tasked with the responsibility of identifying breaches in nursing practice that may be responsible for the infection. Policies and procedures are revised, and educational inservices related to the prevention of CRBSIs are provided to the staff. The use of chlorhexidine was implemented as a QI intervention after a literature review, and the hemodialysis policy and procedure were changed to support the new practice of using chlorhexidine and chlorhexidine caps for dressing changes. I conducted this QI evaluation project to validate whether this intervention was effective in reducing CRBSIs.

I kept all data in a password protected computer that was accessible only to me. The data from the infection control department were deidentified. I did not obtain any patient information; I accessed only rates of CRBSI for hemodialysis patients treated in this facility.

Summary

I conducted this QI evaluation project to determine whether the QI intervention was effective in improving the rates of CRBSI. In this section, I reviewed the literature and discussed my plans for analysis and synthesis of data to determine if the QI intervention was effective. In Section 4, I will present the findings and offer recommendations.

Section 4: Findings and Recommendations

Introduction

The promotion of EBP is the cornerstone for the success of the implementation of a change agent; therefore it is imperative to conduct a QI evaluation to determine best practices. Stakeholders' active involvement in the implementation of EBP has been found to be an important strategy in the successful implementation and compliance of nursing staff to an EBP project (Byrne, 2019). The purpose of this QI evaluation project was to evaluate whether the use of chlorhexidine was instrumental in improving the rates of CRBSI at a hemodialysis outpatient facility. Despite the first initiative on fistulas in 2004, there has been an increased rate of arteriovenous graphs and arteriovenous fistulas failures and length of maturation, which have promoted the prolonged use of CVC (Franco, 2021). An increase in CVC use continues to play a major role in frequent hospitalizations and increases morbidity and mortality rates for hemodialysis patients (Packer & Kaufman, 2020). The literature search conducted using PubMed, CINAHL, MEDLINE, and EBSCOhost produced reliable evidence that supports the use of chlorhexidine. I organized the data from the literature by the level of evidence and the publication date.

Findings and Implications

I conducted the QI evaluation to determine whether the use of chlorhexidine swabs and caps was effective in decreasing the incidence of CRBSI in hemodialysis patients with CVCs showed that there was a statistically significant difference when the

use of chlorhexidine was implemented. The data for the 3 months Pre chlorhexidine intervention showed that there were five events with a 95% confidence interval (CI) of 0.301, and 1.820 with an infection ratio of -1.089 and a standardized infection ratio of 0.821. The data for postintervention at 3 months showed one event with a 95% CI of 0.009 and 0.860 with an infection ratio of -4.734 and standardized infection ratio of 0.174. When the pre- and postintervention values were compared to the number of predicted bloodstream infections, it was evident that the use of chlorhexidine added value to the control of infection at the facility. The statistically significant difference in pre- and postintervention values is shown in Table A1 (see Appendix). Figure A1 in the appendix depicts the difference in results pre- and postintervention of chlorhexidine scrubs and caps use for catheter dressing changes. The findings for this QI evaluation project are explicit. The rate of CRBSI before the intervention of chlorhexidine was five events in 3 months compared to one event in 3 months during the us the chlorhexidine. The unanticipated limitations or outcomes of the project included the lack of support by the hemodialysis technicians. In addition, other variables such as handwashing and the improper use of the chlorhexidine had a potential impact on the findings.

The implications resulting from the findings are significant to healthcare as they directly relate to the improvement of nursing practice and the care of individuals undergoing hemodialysis. Communities may benefit from the project because it may aid in decreasing the emotional toll of CRBSIs on families. CRBSIs places a financial burden on the Medicare and Medicaid and other health care systems (Hollenbeck, 2011);

therefore, an improvement in CRBSIs may benefit the healthcare system. Institutions are required to meet standards set by the CMS and the Kidney Foundation in order to be financially reimbursed for the services they provide to patients undergoing hemodialysis (Centers for Medicare and Medicaid Services, 2022). Potential implications to positive social change include the dissemination of the findings with other hemodialysis facilities within the local area. Another positive impact from a reduction of CRBSIs on the aging population may be a decreased incidence of renal failure increases.

Recommendations

The recommendations based on the results obtained from the QI retrospective evaluation are to continue with the intervention that is in place. The implementation of policy guidelines should be undertaken that provide a detailed account of how to effectively use chlorhexidine scrubs for dressing changes and chlorhexidine caps that provide added infection control for CVC lines. A staff education program should be created for new hires with annual competencies to validate nursing knowledge, and practices should be put in place to maintain compliance with the use of chlorhexidine swabs and caps.

Contribution of the Doctoral Team

The doctoral team consisted of my chair, the second member, the university research review member, and me. My chair was instrumental in providing guidance and support throughout the DNP project. The successful completion of this project was highly dependent on the guidance of the chair, who demonstrated knowledge of the DNP project

process. The second member provided feedback that was valuable during the entire process. The university research reviewer's involvement was also necessary for the completion of the DNP project. Working together as a team, we were able to achieve a successful project. Based on the positive results, I plan to circulate details on the QI project's effectiveness with other hemodialysis facilities.

Strengths and Limitations of the Project

The success of any project was possible because of the support of the stakeholders. The QI retrospective analysis DNP project was supported by the stakeholders, who provided their input. The results of the project may provide knowledge that stakeholders can use to improve nursing practice and patient outcomes. Using Lewin's change theory, I conducted a retrospective analysis to answer the question of whether chlorhexidine use to decrease CRBSI provided represented an effective process of change undertaken by the hemodialysis facility. The recording and reporting of CRBSI by the facility during quality assurance and performance improvement meetings and to the National Kidney Foundation increased the validity of the results. Another strength of the QI project was the use of quality measures. Benchmarking in healthcare allows for a comparative evaluation and identification of the underlying causes of low- or highperformance levels (Thonan, et al., 2015).

The limitations of the QI project were the hemodialysis staff's negative attitude and lack of understanding regarding the use of chlorhexidine. Ineffective use of chlorhexidine could result in a rash at the catheter insertion site (Australian Society of

Clinical Immunology and Allergy, (2019). The rash without allergy testing was referenced by the nursing staff as an allergic reaction and the use of chlorhexidine would cease. Stopping the use of chlorhexidine had an impact on the results of the project. Several other variables such as handwashing and improper technique for CVC dressing changes were a hindrance in obtaining accurate data on the effectiveness of the chlorhexidine scrubs and caps. Proper handwashing techniques plays a major role in the control of infections (Centers for Disease Control and Prevention, 2022); as such, proper technique when using chlorhexidine would also impact the results of the findings. Inadequate catheter dressing supplies due to the delivery process of the off-site facility and a staff shortage due to COVID-19 may have skewed the results. Ineffective communication between the hemodialysis staff and the stakeholders was a weakness as staff did not accurately report misuse of chlorhexidine. Constraints of time was a limitation because the analysis of 3 months of data postintervention cannot determine the longevity of the staff compliance with chlorhexidine use.

Those undertaking future projects on hemodialysis CRBSIs, and similar topics increase their focus on more literature review and increase the length of time allotted for the project. The researcher or project manager should also consider the impact of proper handwashing and staff education on chlorhexidine as these variables play a role in the control of CRBSI (Knepper, et al,.2020). In Section 4, I will address the findings of the project, its strengths and limitations, and the role of the doctoral team. In Section 5, the dissemination plan and self-analysis will be discussed.

Section 5: Dissemination Plan

Dissemination of the evidence is a necessary part of the QI evaluation as it provides insight into what practices are effective and what changes need to be put into place to produce positive patient outcomes. The purpose of this QI evaluation was to determine whether the intervention of chlorhexidine that was put in place was effective in reducing CRBSI. I also sought to educate the hemodialysis staff on the importance of providing quality EBP patient care, which, research shows, promotes improved patient outcomes (Portney, 2020). To disseminate the findings, I discussed the recommendations with the facility director and the infection control director. I have developed a PowerPoint presentation to communicate the project and the results to stakeholders. The results may inform the development of a CRBSI policy with initial and annual staff competencies and peer monitoring to maintain compliance with the use of chlorhexidine scrubs and caps. The results may also be posted in the organization's local newsletter that will circulate not only throughout the organization but to other facilities that may be facing similar obstacles.

Analysis of Self

Self-analysis is an important first step toward achieving one's goals. It serves as a road map toward the achievement of one's highest potential. My role as a DNP student was to successfully manage and complete this project. I began this project with limited knowledge on the research and evaluation process. At the completion of the project, I feel

that I have exemplified Benner's novice to expert theory (2020). I am a lifelong learner, and I strive to promote excellence through EBP. My role as a scholar and practitioner is to provide guidance and input into an innovative healthcare system. As a leader, my plan is to be effective in providing a voice and advocating for a healthcare system that is free of biases and attainable to all individuals. My goal is to create change by demonstrating leadership and providing guidance for nursing staff education. My ultimate life goal is to leave behind a legacy that future generations can benefit from and build on. The attainment of this DNP degree elevates me in the nursing profession.

Summary

As baby boomers in the United States achieve the age of retirement and the population ages, the prevalence of chronic renal failure is expected to increase as are other chronic diseases (Huston, 2021). The issue of CRBSI is also predicted to rise with the rate of chronic renal failure as hemodialysis treatment is initiated using a CVC (Farrington, C.A., & Allon, M., (2019). The hemodialysis population will benefit from the decrease in CRBSI because of proper and increased use of chlorhexidine. The results from this QI project may support a change in nursing practice that leads to improved patient outcomes, reducing the incidence of hospitalizations and morbidity and mortality rates. Society may benefit from a decrease in CRBSI as state funds used in the treatment of CRBSI can be directed towards health prevention rather than treatment. As such, the implementation of the EBP discussed in the project may effect positive social change at the local, state, and national level.

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Appendix: Hemodialysis Bloodstream Infections

Table A1

Standardized Infection Ratio for Hemodialysis Bloodstream Infections

Summary	In-plan	# Of	# Of	SIR	95% CI	Excess months
patient	events	predicted	infection	months	BSI	

Preintervention (3 months)	198	5	6.0888	0.821	0.301, 1.820	-1.089
Postintervention (3 months)	201	1	5.7337	0.174	0.009, 0.860	-4.734

Note. BSI = bloodstream infections; SIR = standardized infection ratio. A 95% CI was only calculated if the observed CRBSI was > 0.

Figure A1

Depiction of Event Rates 3 Months Preintervention and 3 Months Postintervention