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# Development of a Bundle for Hemodialysis Infection Control

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# Walden University

College of Health Sciences

This is to certify that the doctoral study by

Lora Lewis

has been found to be complete and satisfactory in all respects,  
and that any and all revisions required by  
the review committee have been made.

## Review Committee

Dr. Susan Hayden, Committee Chairperson, Nursing Faculty

Dr. Cassandra Taylor, Committee Member, Nursing Faculty

Dr. Oscar Lee, University Reviewer, Nursing Faculty

The Office of the Provost

Walden University  
2019

Abstract

Development of a Bundle for Hemodialysis Infection Control

by

Lora S. Lewis

MS, Walden University, 2014

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

November 2019

## Abstract

Hemodialysis patients are at high risk of acquiring a blood stream infection (BSI), the second leading cause of death in this population. The purpose of this project was to create a clinical practice guideline (CPG) based on current evidence-based practice (EBP) that would bring a cohesiveness to the policies and provide an auditing tool to monitor infection control practices. Current literature supports the bundle approach, a small set of EBPs combined as a group of recommended interventions that apply to a specific patient population with the goal of improved delivery of care. The hemodialysis bundle project incorporated the theory of planned behavior to create a set of evidence-based interventions developed from an in-depth review of current, peer-reviewed studies. Three experts reviewed the CPG using the Appraisal of Guidelines for Research and Evaluation Instrument II; the scores from the 6 domains showed approval of the guideline as it was created with a score of greater than 90%. The three experts were chosen because they are responsible for updating and writing policies for the hemodialysis units. The creation of a CPG to improve infection control practices might benefit hemodialysis staff by providing an organized and cohesive method of following current policies. The new CPG might impact social change by applying current EBP to a clinical practice with end results of improving hemodialysis care and patient outcomes.

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## Dedication

This project is dedicated to my brother Ricky and all other dialysis patients. May this project continue to inspire other health care professionals to seek the knowledge needed to provide the highest quality evidence-based care available.

## Acknowledgement

First, I would like to thank Almighty God, as, without him, I would not have had the faith nor strength needed to complete my educational goals. I would like to express my sincere gratitude to my Committee Chair, Dr. Susan Hayden, who despite her busy schedule was amazingly quick with feedback. Her continuous support, patience, motivation and immense knowledge that made a seemingly difficult journey seem achievable. I could not have imagined having a better advisor and mentor. She was critical to my success. I also thank God for bringing us together. She has left a footprint in my life that will last forever. I would like to express my sincere appreciation to Committee member, Dr. Cassandra Taylor for her insightful comments, encouragement and also the hard questions which incited me to widen my perspectives. Thank you to my Nursing Manager, Yolanda Graham for allowing me the room to grow with continued encouragement to pursue my educational goals. Also, I would like to thank my preceptor, Kristen Guadalupe, PhD for leading me in the right direction to realize a promise for the future. Last but not least, I would like to thank my family: Darnell, Courtney, Ricky, Tony and Robin, Joshua and David for supporting me spiritually throughout my journey and my life in general. Life would not be the same without your understanding of my availability and presence.

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## Section 1: Nature of the Project

### **Introduction**

Each year in the United States, more than 300,000 patients receive ongoing maintenance hemodialysis (HD) for the treatment of end-stage renal disease (ESRD; Rebmann & Barnes, 2011). The risk of bloodstream infections (BSIs) in HD patients is 100-fold higher than in the general population, 45.2 versus 0.4 episodes per 1,000 patient-years (Fitzgibbons, Puls, MacKay, & Forrest, 2011). Infections have been identified as the second-leading cause of death in the HD population (Hess & Bren, 2013). There is an inherent risk that predisposes this population to infection with vascular medical devices, immunosuppression, the frequency of close contact, and the nature of the dialysis procedure (Rebmann & Barnes, 2011). When HD patients acquire an infection, the risk factors are increased for morbidity and mortality.

The data in the United States show that BSI occurs at a rate of 0.5 to 27.1 per 100 dialysis patients in a month (Fram et al., 2014). The average cost of hospitalization of an HD patient with a BSI was estimated to be \$24,034, placing an enormous burden on healthcare organizations (Lindberg et al., 2013). The rate of HD acquired BSIs is expected to rise by 150% by the year 2020, making prevention a priority (Lindberg et al., 2013).

The staff plays a significant role in HD treatment, and this increases their contribution to the prevention of BSI. There was not a policy in place in the HD unit where the DNP HD project was introduced that combined a set of evidence-based practices to be performed collectively as a bundle to improve infection prevention practices of the staff and there has been limited research on dialysis center practices'

infection prevention. Many of the recommended practices in dialysis centers have been extrapolated from studies conducted in hospital intensive care units (Hess & Bren, 2013).

A bundle is a small set of evidence-based practices that are combined as a group of recommended interventions that are applicable to the patient population with the goal to use them as usual practice and improve care delivery (Resar et al, 2012). The introduction of bundles was originally an initiative by the Institute for Healthcare Improvement designed to reexamine the structure and assumptions of care delivered in the intensive care unit. The outcome was to design processes that provided reliable care that would prevent serious adverse events (Resar et al, 2012). The use of bundles is recommended in the current literature as a method of increasing staff compliance with nursing processes and policies (Resar et al, 2012).

Current interventions are focused on decreasing the effect of BSI after they occur (Rebmann & Barnes, 2011). The creation of an HD bundle is a significant step in the improvement of overall healthcare and quality through prevention. The cost of treating a patient with a BSI is \$24,034, while there is a nominal cost to monitor staff practices when initiating and discontinuing HD treatment. The DNP HD bundle merely combines all components of HD care to be monitored for compliance with the aim of improving staff compliance, reducing infections, and improving patient outcomes.

## **Problem Statement**

### **Local Practice Problem**

The nursing problem that existed in the HD unit where this DNP HD project took place is that there was not strict adherence to infection prevention policies. The policies that were in place were not cohesive, which made them difficult to be followed

consistently, and there was no method to monitor the steady use of these policies. The incidence of BSIs in HD centers is exceptionally high (Patel, Kallen, & Arduino, 2010). Similarly, in the last 6 months at the practice site where this DNP HD project will be implemented, there has been a reported nine HD related infections verified through positive blood cultures, with six in the inpatient HD patient unit and three in the outpatient HD unit. The organization has deemed this an alarming rate and wanted to concentrate efforts on prevention. To address this issue at the local level, a bundle combining a set of evidence-based practices was created along with a monitoring protocol to produce behavioral and cultural changes in the HD unit staff. To lower the rate of infection control breaches in practice, there must be changes in the process as well as alterations in the staff's behavior and social culture (Lindberg et al., 2013). HD places the patient in a complex, high-risk care environment because of the direct exposure to the bloodstream; most breaches of infection control practices by staff are not deliberate. The creation and introduction of the HD bundle with an audit tool and immediate feedback is meant to decrease the likelihood of breaches in infection prevention practices.

The current policies were not cohesive, which made them difficult to be followed consistently, they did not follow the latest evidence-based practices (EBP), and there was not an auditing tool in place to ensure staff compliance. The absence of a method to ensure the HD staff's compliance with infection control practices was a missing element for the HD, unit and this impacts patient outcomes. Powers, Armellino, Dolansky, and Fitzpatrick (2016) described poor compliance rates that exist across nursing units with less than adequate use of eye protection, appropriate use of gloves, and handwashing before and after patient contact during the initiation and discontinuation of HD treatment.

Garrick and Morey (2015) stated that HD staff washed their hands only 22% of the time before initiating dialysis and 19% of the time before caring for the bloodlines.

Nurses are the leaders of patient care and must role model appropriate interventions to ensure that all staff are consistently adhering to infection control prevention practices (Carrico, 2018). Nurses have always been advocates for the patients and must lead the team to provide the best possible care available. The DNP HD bundle project was an opportunity to introduce into practice an innovative idea in the holistic care of the HD patient adding an auditing component to the infection control practices that were not present but were needed to improve the quality of patient care and consistency of staff compliance.

### **Purpose Statement**

The goal of creating the DNP HD bundle was to address the gap in practice where the current policies are not cohesive, which makes them difficult to be followed consistently. They do not follow the latest EBP, and there was not an auditing tool in place to ensure staff compliance. The creation of the DNP HD bundle includes the latest EBP and an auditing tool that allows nursing leaders to examine if the expectations of the policies are being met. The DNP HD bundle project was developed from the current literature and agency recommendations to design an evidence-based quality improvement project to enrich the delivery of HD care through infection prevention.

The practice-focused question this DNP HD bundle project addressed was:

PFQ: What evidence based clinical practice guidelines can be developed and validated regarding risk reduction of blood stream infection in patients receiving hemodialysis? The answer is yes, the literature supports bundling of infection

control practices with an auditing component to decrease BSIs in the HD patient. McCann, Clarke, Mellotte, Plant, and Fitzpatrick (2013) stated that in the HD unit the failure to use the recommended precautions is a major cause of transmission of infections. These authors also suggested that bundling EBPs along with a surveillance program to audit compliance will strengthen the essential components of infection prevention. A culture of safety is a standard of care, and it is crucial that the infection control prevention program encompasses the latest EBP and auditing the practice for compliance. Introduction of the HD bundle is meant to (a) organize the latest EBP for infection prevention in an HD unit, and (b) streamline the infection control practices into a bundle.

New initiatives, methods, and practices must be implemented to improve healthcare in the HD unit. McClarigan, Mader, Larabie, Gokey, and Leitsch (2014) reported that using a bundle has the potential to solve the problems related to the high uncertainty and low predictability in patient care and outcomes. The DNP HD bundle project provided an opportunity for knowledge translation, education, and skill enhancement for staff members (Ulrich & Manning-Crider, 2017). Creating an HD bundle with auditing practice compliance should increase compliance with EBP in infection prevention while decreasing the rate of infection (Rebmann & Barnes, 2011).

The Agency for Healthcare Research and Quality (AHRQ; 2017) has stated that there is a critical need to change practice and comply with the latest evidence. This sentiment has been echoed by the Joint Commission of Hospital Accreditation (2018), and HD units are now considered one of four high-risk areas included in an enhanced evaluation during onsite surveys. The purpose of the DNP HD bundle project was to



create an infection control bundle that will improve infection control practices through auditing staff compliance with a checklist tool. Initiatives and methods must be aligned with current EBP to create methods that clearly outline what is expected and audit the compliance of staff in meeting those expectations. The focus of care should be on quality outcomes as the drivers of change.

### **Nature of the Doctoral Project**

#### **Improvement of Infection Prevention Practices in Hemodialysis Care**

I used the Manual for Clinical Practice Guideline development (Walden University, 2017) in the development of the DNP HD bundle as a method of presenting evidence and knowledge to deliver safe, effective infection prevention to the HD population. The creation of the DNP HD bundle has assisted nursing leaders by providing a focus for quality control that includes a component to audit and address nonadherence of infection control practices. Current best practices, such as those that were included in the HD bundle, provide a framework to ensure that improved patient care standards are consistently and reliably applied to every patient encounter. There is a need to improve the patient experience and quality of care while receiving an HD treatment. The HD bundle with monitoring will reduce healthcare costs. The DNP quality improvement project provides an opportunity to improve clinical practice through an examination of the evidence and leading the initiative for change. Improvements in clinical practice through the utilization of the latest evidence are a top priority and give credibility to the DNP as a leader of change (Redman, Pressler, Furspan, & Pomtempa, 2015).

## Sources of Evidence

The HD bundle project began with a literature review identifying recommended peer-reviewed articles in infection control practices for HD units. The library databases that I used were Walden University Library, CINAHL and Medline combination search, Thoreau, CDC, AHRQ, Joint Commission of Hospital Accreditation, and the Association for Professionals in Infection Control and Epidemiology (APIC). I used the following keywords and phrases for the search: *infection prevention in HD, practice bundles, EBP in HD infection control, and utilization of audit tools*. The search focused on articles published between the years of 2013 and 2019. Also, I conducted an online search to locate agencies that have outlined proposals for the implementation of infection control practices in HD units. After an early review of the literature and agency recommendations, I found that any infection control prevention program in an HD unit should include monitoring (Centers for Disease Control and Prevention [CDC], n.d.).

Utilizing the literature and agency recommendations, the DNP HD bundle with the auditing tool was created to streamline the current practices to focus on the period of high risk for infection transmission during HD, the introduction of needles for a fistula or graft, and when accessing the ports of a catheter and during the connection of the lines to initiate HD treatment. The current infection prevention procedures divided the infection control practices into eight to 10 separate policies and procedures, with no monitoring; the DNP HD bundle has condensed these to six elements that encompass the infection control practices that are evidence-based, and the bundle contains a component to monitor compliance of staff. The auditing tool is a checklist that contains the elements of the bundle that occur at the initiation of the HD treatment, which is considered high risk

for acquiring BSIs. The introduction of a bundle is a novel idea for this Midwestern HD unit and will provide a set of evidence-based interventions that, when used together, could significantly improve patient outcomes while auditing for staff compliance (McCarron, 2011).

The DNP HD bundle has addressed a gap in practice where the current policies were not cohesive, which made them difficult to be followed consistently. They did not follow the latest EBP, and there was no monitoring tool in place to ensure staff compliance. By utilizing the latest evidence and updating current policies, an effective method of preventing BSIs was developed in HD that transfers research-based recommendations to practice. The DNP HD bundle has provided nursing leaders with a tool that can be used to enhance communication and define practice expectations to the staff and reduce the likelihood of harm to the patient (Kliger, 2015).

### **Significance**

The HD patient is the primary stakeholder of this DNP HD bundle project because of the effect that a BSI has on the patient's quality of life. BSIs that are acquired in HD units can disable, hospitalize, and lead to prolonged illness in HD patients while disrupting lives and increasing the cost of treatment (Lindberg et al., 2013). Some of this cost must be absorbed by the organization, making them a stakeholder as well. For HD care, the organization is reimbursed a single payment for all the services performed to treat an HD patient; this includes hospitalizations for BSIs (Centers for Medicare and Medicaid Services, 2017). High infection rates reflect on the quality of care given in an HD unit and can influence new patients wanting to receive treatment at an HD unit with a reportedly high rate of BSIs. When a patient acquires a BSI, the organization's

operational budget is affected and the loss trickles down to frontline HD staff in the form of frozen wages, a decrease in staff hiring, and wages that are not competitive making it difficult to attract qualified applicants to open positions (Gupta, Cannon, & Srinivasan, 2013); thus, staff are secondary stakeholders.

Current practices were not adhered to by staff members, which leaders believe was a contributing factor to the rate of BSIs in the unit (Personal communication, unit manager, January, 2019). There was not an infection control bundle with an auditing tool that has been presented to HD units. The goal of the project was to provide HD nursing leaders with a streamlined and updated version of the current infection prevention policies, making them easier for staff to follow while including an auditing tool to ensure compliance. The auditing portion of the DNP HD bundle will allow nursing leaders to focus education on areas of weaknesses. The creation and introduction of the DNP HD bundle can change the method of infection control practices throughout the dialysis community. Once the DNP HD bundle has been demonstrated as effective, it can be transferred to HD units across the United States as a method to improve standards of nursing practice along with decreasing the risk of infections in the HD unit.

The project's significance for social change is the opportunity to improve nursing practice in HD centers. The project was guided by evidence-based literature and standardized clinical guidelines and using the recommendations from the CDC (2011), APIC (2011), and AHRQ (2017) as best practices in an HD unit. Reminding staff to follow these guidelines can potentially save lives and money. The social change impact to prevent the spread BSIs in the HD environment through infection prevention will ultimately improve the quality of nursing practice and patient care. The bundle

standardizes staff practices and creates a culture of safety that will positively impact the HD patient population.

### **Summary**

The presence of six BSIs in the inpatient unit and three in the outpatient unit during a 6 month period has caused alarm among the organizational leadership at the facility where this DNP HD project was implemented. A structured process for addressing the problem was needed, and the DNP HD bundle used scientific inquiry in addressing the existing problem of infection prevention within the HD unit. When a patient acquires a BSI as a direct result of receiving an HD treatment it affects the patient's entire life and family structure; in addition, the financial stability of the organization is threatened due to absorbing the high cost of treatment and prolonged hospitalization, and frontline staff feel the effect through freezing of wages and low patient admissions to the unit (Fitzgibbons et al., 2011). The DNP HD bundle project addressed the gap in practice for inconsistent adherence to infection prevention practices by staff by giving nursing leaders a tool that can be used for educating staff and auditing compliance to the new policies. The HD unit will be the first unit to implement an HD bundle that addresses infection control practices in the small Midwestern HD unit and will standardize infection control practices. Introducing the DNP HD bundle project to nursing leaders demonstrate excellence in care and realigns systems and priorities to expand the use of EBPs. Using HD bundles will embrace innovations to empower nurses and positively impact the care delivery system.

The next section is a plan for the HD bundle, discussion of the TPB that was utilized, and the project's relevance to nursing practice in the prevention of avoidable hospitalizations and containing care cost. My role as the DNP student is also outlined.

## Section 2: Background and Context

### **Introduction**

The nursing problem that existed in the HD unit where this project took place is that there was not strict adherence to infection prevention policies and no method to assure nursing managers that staff was strictly adhering to infection prevention practices. Strict staff compliance is needed with infection control practices for the minimalization of the incidences of infection control practice breaches (Garrick & Morey, 2015). The incidence of acute infections in ESRD continues to be a significant problem and is the second leading cause of death in this group. In the United States, treatment of a BSI is a large economic burden on the patient, the healthcare organization, and insurance providers (Fitzgerald et al., 2011). In the DNP project I sought to answer the practice-focused question: What evidence based clinical practice guidelines can be developed and validated regarding risk reduction of blood stream infection in patients receiving hemodialysis? The goal in the creation of the DNP HD bundle was to address the gap in practice where the current policies were not cohesive, which made them difficult to be followed consistently. They did not follow the latest EBP, and there was not a monitoring tool in place to ensure staff compliance. This second section introduces the model that was utilized, the significance and applicability of an HD bundle to current practice, the context that infection prevention has on the HD patient and the DNP student's role.

### **Theoretical Framework**

The HD bundle project incorporated the TPB (Ajzen, 1991), one of the first theories utilized in healthcare from the behavioral sciences to explain human behavior and the influences that assist in modifying unwanted behavior (Ward, 2013). Through the

TPB framework, Ajzen (1991) suggested a method to create interventions that are designed to influence behavior and can be transferred to impact adherence to infection prevention guidelines positively (Kretzer & Larson, 1998). Ajzen (1991) stated that the TPB model would provide information that would allow the participants to consider the consequences of their actions as related to that behavior. The theory is an influential model that explains human behavior and has allowed for the successful development of healthcare interventions (Ajzen, 1991). Interventions that are designed to change behavior can be directed at one or more of its causes: attitudes, cultural climate, or the ability to change the behavior. When there are changes in these influences, there will be changes in behavioral intentions. When the staff participants are given adequate control, power, and know-how over the behavior, the new objectives are more likely to be carried out (Ajzen, 1991). Understanding the reasons for noncompliance helps to determine the best strategy for the improvement of behavior with the ability to target the aspects that are less than satisfactory (Powers et al., 2016).

Jeong and Kim (2016) described how using the TPB model could lead to a better understanding of the reasons nursing students did not perform hand hygiene consistently. When behavioral barriers were removed, hand hygiene performance increased, the cultural climate transformed, and the ability to change behavior was high. The benefits of a behavior change theory are as essential as the factors that influence the targeted behavior. The intervention components enable the standardization of the expectations of the HD staff to comply with infection control practices. The feedback component allows for verbal cues to the HD staff on how to perform the wanted behavior. This increased the staff's confidence in their ability to complete the wanted behavior successfully. The



TPB focuses on individual strategies, peer-based initiatives that foster a sense of shared responsibility along with management-driven solutions to tackle the issue of noncompliance with infection prevention in the HD unit (White et al., 2015).

Ward (2012) postulated that the application of the TPB on midwifery and nursing shows the intention to perform infection control practices are changed and can be influenced by factors at different stages. Providing midwifery students with direction and relating the reasons why infection control practices were significant in the care of patients provides the initial education and knowledge that could lead to compliance.

### **Relevance to Nursing Practice**

Since the beginning of nursing, infection prevention has been a significant element of nursing care. Nightingale (1863) wrote that infection prevention is the first requirement in a hospital, that when caring for the sick, nurses should do no harm. Nightingale championed infection prevention and held strong opinions on the critical nature of hygiene practices to decrease mortality rates through strict prevention practices (Letizia, 2010). Since the herald of Ms. Nightingale, the medical community has sought methods to control the spread of infections, especially in a healthcare setting.

The CDC opened its doors in 1948 and along with the World Health Organization has pursued solutions to infection control prevention through research and recommendations for practice. There also have been changes to societal expectations throughout the country for BSI prevention programs. There have been a series of high-profile outbreaks following breaches in infection control procedures, predominantly in outpatient settings, that has led to federal and state regulator policy actions (CDC, 2011).

Gnass, Gielish, and Acosta-Gnass (2014) conducted a study between January, 2011, and December, 2012, that included 619 HD patients in a county hospital and detected a rate of BSI at 3.33 per 1,000 HD sessions. The study showed a statistical significance that was associated with the infection rate and the initiation of HD treatment. Between 1993 and 2007, the rate of HD patients requiring hospitalization for BSI was 38%, with a rate of 102 per 1,000 HD treatment (Rebmann & Barnes, 2011). A multicenter survey was conducted by Askrian et al. (2014) that found a large percentage of staff did not adhere to standard precautions for infection prevention in an HD unit.

The patient receiving HD treatment is vulnerable to contracting BSI due to frequent and prolonged exposure to potential contaminants that are in the dialysis environment (Lindberg et al., 2013). The HD treatment exposes the immune-compromised ESRD patient to the prevailing environmental conditions with an increased potential for infection transmission. This has led to the need for the creation and implementation of stricter infection prevention control measures

Various organizations have generated guidelines and recommendations on infection prevention and control in the HD setting. The first set of the guidelines was published in 1977 by the CDC and was focused on preventing Hepatitis B. Throughout the years the CDC has updated these guidelines to reflect current EBPs. The CDC, along with APIC (2011; Rebmann & Barnes, 2011) and the AHRQ (2014) have created tools and checklists focusing on hand hygiene, access site preparation and cleansing, and reducing BSI transmission during connection and disconnection of the HD lines.

All the BSI prevention toolkits have one central theme, to adopt infection prevention tools to meet the needs of the unit and the use of auditing tools to ensure there

is staff compliance. Infection prevention in most units consists mainly of monitoring the infection rate of patients without surveillance of staff practices (McCann et al., 2013). The DNP HD bundle has filled the gap in nursing practice by the creation of a tool that streamlines and communicates staff expectations in infection prevention and audits compliance with those expectations. Nursing leaders must have an infection prevention program in HD that ensures the staff's strict adherence to infection control policies. The introduction of the DNP HD bundle has provided a future opportunity to research the effectiveness of HD bundles in the improvement of infection control practices by staff in HD units.

### **Local Background and Context**

The DNP bundle project is the first nurse-led intervention in the 20-chair outpatient HD center that provides treatment three times a week to the clients that it serves. The layout of HD units is unlike that of inpatient hospital units. The area is a large single room where multiple patients receive extracorporeal treatment with prolonged blood exposure. There is also one staff member who cares for multiple patients, increasing the risk for the transmission of infection. The DNP HD bundle project provides stricter measures that are specifically recommended and evidence-based for infection prevention in an outpatient dialysis unit (Karkar, Bouhaha, & Dammang, 2014).

Infection prevention is a fundamental aspect of providing high-quality, safe HD. Monitoring is currently performed on patient infection rates with monthly cultures of the dialysis machines and the reverse osmosis system that supplies the purified water for the HD treatments. There has been no structured program for surveillance of staff practices. In the last 6 months, there has been a reported nine HD-related infections verified

through positive blood cultures with six in the inpatient HD patient unit and three in the outpatient HD unit. Accredited hospitals that offer outpatient dialysis services have an active infection control program that includes auditing of staff practices (Hess & Bren, 2013), but freestanding units typically do not have this type of structured programs. A Canadian study by Hess and Bren (2013) demonstrated evidence of the economic benefit of a well-structured infection program, decreasing the cost of care for an HD patient by 20%–30%. The introduction of an infection prevention program provides a double benefit of saving money while simultaneously improving the quality of care (Hess & Bren, 2013).

### **Institutional Context**

The HD unit where the project has been introduced provides HD treatment for 80 patients three times a week. The staff complement consists of a nurse manager, an assistant nurse manager, five RN's, and nine dialysis technicians. The vision of the unit is to provide safe, quality HD care while reducing the cost to the organization. This population of patients had previously been referred to outlying community HD centers: the midwestern HD unit started as a pilot project and within the last year has been converted to a permanent outpatient HD site. The CDC recommended that requirements be outlined to help facilities strengthen their infection control procedures and adhere to best practices for the prevention of BSI (Gupta et al., 2013).

### **Terms and Definitions**

The following terms were defined for the current project.

*Care bundle:* A set of evidence-based interventions for a defined patient care setting that when implemented together will result in significantly better outcomes than when implemented separately (Resar et al., 2012).

*Reverse osmosis system:* A pump that pushes water through a semipermeable membrane or filter to remove almost all of the contaminants including bacteria and viruses. The product water is ultrapure water, which enters the HD machine and is used to mix the dialysate for dialysis treatment (Agar, 2015).

### **State and Federal Context**

Since 2008, Medicare has not paid the additional costs that are due to BSI in the HD patient; this amount is absorbed within the cost of treating the original diagnosis of ESRD with HD (Pronovost, Marsteller, & Goeschel, 2011). The national and state drivers for BSI prevention are now fueled by several federal initiatives to advance BSI prevention programs. There is now a National Action Plan that utilizes the recommendations of multiple agencies to supply a roadmap that outlines the best available and current evidence to support the practical effectiveness of infection prevention programs. There also is a recommendation that state and federal funds be expanded to help improve resources to individual HD centers through networking and providing expertise in quality improvement through interoperability of data and sharing of successful clinical practice interventions (Gupta et al., 2013). The facility is encouraging nursing leadership to involve staff in finding a solution to the problems through education on EBP and how to implement changes at the unit level.

### **Role of the DNP Student**

As the DNP student, I am also the assistant nurse manager of the outpatient unit, providing direct patient care and administrative duties for the HD unit. I performed the literature search, reviewed the current recommendations, and created the DNP HD bundle using EBP and guidance from the audit and tools kits on the CDC website, as the CDC website does not have an HD bundle with an auditing tool. Once the DNP HD bundle was created, my role was to introduce the DNP HD bundle to administrators and managers as a finished product that will be utilized in the improvement of infection prevention in the HD unit. Nursing leadership have the ability to adapt the product to the unit's specific needs. After the DNP project completion, I will also provide support as the DNP HD bundle is introduced to the staff by the nursing manager.

The previous infection prevention education was generic to the entire organization and did not specify monitoring of practices in the HD unit. Denton, Topping, and Humphreys (2016) said that utilizing surveillance or monitoring tools in the prevention of infection will contribute to the overall reduction of infections at the site and lead to prevention. The DNP HD bundle project has bridged the gap in practice where the current policies were not cohesive, which made them difficult to be followed consistently, they did not follow the latest EBP, and there was not a surveillance tool in place to ensure staff compliance. Healthcare organizations must have leaders who will serve as mentors to teach the current recommended practices to the HD staff through the introduction of a bundle with monitoring that may eclipse their past experiences and practices (Resinger et al., 2017).

My practicum preceptor was the director of quality management. While working with her on departmental projects, she suggested that I focus on an improvement that was needed in the HD unit where I worked. When making the environment of care rounds I found that there was not an auditing tool used to assure that the HD staff adhered to recommended infection control practices. There also was a concern about the rate of infections occurring in the unit. This began my literature search for EBP in HD care and the motivation for the DNP HD bundle project; I wanted to improve infection prevention practices through the introduction of the most recent recommendations for infection prevention in the HD unit. The DNP HD bundle project will improve infection prevention practices in the outpatient dialysis unit through the utilization of current EBP recommendations, along with surveillance and feedback. The DNP HD bundle should enhance communication as it outlines the expectations in compliance. Leaders can use audit and feedback as a vital method in sustaining practice changes (Fleischer, Semenic, Ritchie, Richer, & Denis, 2016). Professional practice development is about engaging the HD staff in processes to build their collective and individual capacities for providing patient-centered, evidence-based, high-quality care (Fleischer et al., 2016). No biases have been addressed in the DNP HD bundle project because it is introducing current evidence into practice for infection control in the HD unit.

### **Summary**

Prevention strategies are the best way to avoid infections and the complications that accompany them. The HD staff is unfamiliar with bundling infection control practices, auditing practice, and providing feedback to improve infection prevention practices. The TPB provided me with an understanding of the inquiry into human

behavior that will help change the ideas of staff members and influence their view on the importance of infection control practices in HD care. The DNP HD bundle has offered an alternative solution to the current infection prevention practices and may help to decrease breaches. Section 3 describes how the evidence supports the use of bundles to improve nursing practice, infection prevention processes, and patient care. There is also a review of the literature to demonstrate the need for implementation of this practice and the evidence to support the use of a bundle.



### Section 3: Collection and Analysis of Evidence

#### **Introduction**

The incidence of BSIs in HD centers is exceptionally high (Rebmann & Barnes, 2011). To lower the rate of infection control breaches in practice, there must be changes in the process as well as alterations in the staff's behavior and social culture (Lindberg et al., 2013). Infections in an HD unit are a costly burden to the patient, the organization, and insurance providers. Strategies that are aimed at using EBP such as bundles and surveillance tools improve the transparency of the organization, work environment, and patient outcomes (Whelchel et al., 2013). The goal of creating the DNP HD bundle was to address the gap in practice where the current policies were not cohesive which made them difficult to be followed consistently. They did not follow the latest EBP, and there was not a surveillance tool in place to ensure staff compliance. Most breaches of infection control standards by staff are not deliberate. In this section, I have described how the evidence supports the use of bundles to improve nursing practice, infection prevention processes, and patient care. There is also a review of the literature to demonstrate the need for implementation of this practice and the evidence to support the use of bundle.

#### **Practice-Focused Question**

This DNP HD bundle project answered the practice-focused question: What evidence based clinical practice guidelines can be developed and validated regarding risk reduction of blood stream infection in patients receiving hemodialysis? The nursing problem that existed in the HD unit where this project took place was that there was not strict adherence to infection prevention policies and no method to assure nursing

managers that staff was strictly adhering to infection prevention practices. The creation and introduction of the DNP HD bundle project to nursing leaders has the potential to improve staff adherence to infection control practice in the delivery of HD care. Although there were infection control guidelines in place for the outpatient HD unit, the creation of a clinical practice surveillance system is the first for this organization to ensure compliance with infection control practices by the staff. The DNP HD bundle was created as an initiative and method to align EBPs with policies and procedures that guide frontline staff with an approach to focus on quality outcomes as the drivers of change (McClarigan et al., 2014). Through the introduction of the DNP HD bundle (Appendix B) with a monitoring tool (Appendix C), I have addressed the gaps in adherence to infection control practice through auditing staff practice with immediate feedback to decrease the breaches in practice.

### **Sources of Evidence**

I used the following databases in the literature review for the DNP HD bundle project: PubMed, ProQuest, Medline, Thoreau, and CINAHL. The search focused on articles that discussed infection control prevention in an HD unit along with those that have demonstrated the most effective method to prevent infection in an HD unit. I also reviewed the published guidelines that demonstrate the effectiveness of bundling nursing processes and procedure to improve patient care and outcomes. There has not been an HD bundle developed, so I selected literature that supported the use of bundles for quality improvement of clinical practice for review. Also consulted for infection prevention recommendations were the Institute for Healthcare Improvement (n.d.), CDC (n.d.), and APIC (2010). The following keywords were used in the search: *infection, infection*

*prevention in hemodialysis, bundles, patient care bundle standards, quality, care bundles, and auditing tools in HD.* There were 46 articles chosen for review using Fineout-Overholt, Melnyk, Stillwell, and Williamson's (2010) critical appraisal of EBP tool. The articles were organized using Walden University's literature matrix (Appendix A). The DNP infection control bundle (Appendix B) was adapted from the literature and agency guidelines and created by me for this project as a method of improvement of clinical practice guidelines in infection prevention for the HD unit.

### **General Literature Review**

Resar et al., (2012), along with the Institute for Healthcare Improvement (2012), found that the concept of bundles improves the critical care processes in nursing practice. The aim of using bundles in practice is to reduce the harm and improve the reliability of care processes, thus improving patient care. The assumption is that when using policies and procedures that are presented in a bundle, teamwork and communication have the potential to improve, thus improving patient outcomes. Resar et al. (2012) discovered that using a small set of EBPs that focused on a defined patient population combined into a bundle vastly improved patient outcomes and exceeded expectations. The HD bundle was developed utilizing the recommendations from agencies and the literature that support the bundling of nursing processes to improve adherence to standard practices and policies, thus improving patient care and outcomes. The success of implementing a bundle requires a redesign of work processes and communication strategies along with sustained measurement and vigilance.

McCarron (2011) suggested that the steps of the bundle be carefully selected, well-established practices that are packaged together and scientifically supported. The

bundle focuses on how to deliver the best care possible that results in a better outcome for the patient. Care bundles should become a part of the standard of practice. Resar et al. (2012) stated that combining evidence-based interventions into care bundles can have a significant impact on reducing BSI. The DNP HD bundle is current infection control policies and procedures that have been streamlined to communicate expectations. Care bundles establish the maximum in preventative practices to ensure that the latest EBP is followed in the prevention of BSI. Kliger (2015) also strongly recommended that auditing of practices be implemented to measure compliance and provide opportunities to enhance clinical practices.

Care bundles establish the maximum in preventative practices. It is critical that staff be educated on the care bundle elements and how they should be fully implemented. Auditing the care bundle processes measures compliance and provides opportunities to enhance clinical practices and ensures that all recommended measures are being implemented. The DNP infection control bundle (Appendix B) also contains criteria for monitoring (Appendix C) the effectiveness of the monitoring tool combined with the bundle.

### **Procedures**

The Appraisal of Guidelines for Research & Evaluation II instrument (AGREE II, 2017) was used to assess the expert's agreement on what is recommended for use in the prevention of BSIs in the HD unit. I performed a literature search in which references from 2011 to 2018 were included and critically appraised using Fineout-Overholt et al.'s (2010) EBP tool. As project lead, I developed the DNP HD bundle based on evidenced-based literature and agency recommendations to address the infection control practices at

the initiation of treatment, which has been deemed the greatest period of susceptibility to BSIs for the HD patient. This new clinical practice guideline (CPG) is the DNP HD bundle with an auditing tool in the form of a checklist. Once developed, the guideline was introduced to nursing leaders with an anonymous evaluation using the AGREE II tool (2017). The evaluation addressed the accuracy and reliability of the newly developed guideline and identified changes that may need to be made. Nursing leaders are able to adapt the tool to meet the specific needs of the unit.

### **Protections**

Approval was obtained from the practice site and Walden University's Institutional Review Board (Appendix E; approval number 06-28-19-0363189). The introduction of the DNP HD bundle does not require data collection, so patient or participant information will not be at risk of being compromised; there will be no data collected except the frequency of BSI in the unit. Leadership showed support and agreed to assist with the project. The clinical practice guideline development project focused on providing a tool for nursing leaders to improve infection prevention practice standards in HD care.

### **Analysis and Synthesis**

The hierarchy of evidence is central to the transference of knowledge (Peterson et al., 2014). The 46 articles chosen were reviewed using Fineout-Overholt, et al.'s (2010) EBP tool and organized using Walden University's literature matrix. The keywords and phrases used in the literature search were *bundles, hemodialysis care, HD care, infection control practices in HD, staff adherence in HD care, evidence-based HD infection control practices, and audit tools*. I used the information gathered through the articles and

agency recommendations to create the DNP HD bundle. The manual for CPG was used to identify the gap in practice, create the DNP HD bundle with the auditing tool, and design evaluation that will be used by the nursing leaders to make suggestions for adaptation to the HD unit. The project is considered a component of infection control with observation and will not interfere with patient care (see Garcell, Arias, Miranda, Jiminez, & Alfonso Serrano, 2017).

The AGREE II tool (Appendix D) is used as an evaluation method when developing clinical guidelines. I chose to use this tool because it is a method with proven reliability. The AGREE II Tool contains 23 items that are organized within six domains that evaluate scope and purpose, stakeholder involvement, the rigor of development, clarity of presentation, applicability, and editorial independence. Domain 1, the scope and purpose, address the overall aim of the CPG. Domain 2 addresses the extent to which the guideline represents the views of its intended users, the stakeholders. Domain 3 evaluates the rigor, which is the manner in which the evidence was gathered and summarized and then used to develop the CPG recommendations. Domain 4 evaluates the CPG language, structure, and format. Domain 5 reviews the applicability to HD practice, potential barriers, strategies to improve dissemination, and the resources needed to implement the guideline effectively. Domain 6 addresses the overall assessment of Domains 1 through 5 and whether the guideline would be recommended for use in practice. The items under each domain are rated on a 7-point scale from one (strongly disagree) to seven (strongly agree). The evaluation also allows the panel of experts to input comments or recommendations (Brouwers et al., 2010). Once the AGREE II tools are returned, the results will be compiled and changes made as needed.

## Summary

The prevention of BSI in the HD unit is a significant component of care. Identifying gaps that exist in daily practice and the effect that this has on the patient population is essential to delivering high standards of care expected by the community. The CPGP manual (Walden University. (2017)), along with the Agree II tool (2017), has provided guidance in the evaluating the current infection prevention policies and direction in the creation of the newly developed clinical practice guideline. Fineout-Overholt et al.'s (2010) EBP tool was used along with Walden University's literature matrix to organize and grade the articles the information.

Section 4 summarizes the current gap in local practice along with the findings and implications derived from this DNP HD project. I discuss recommendations based on the outcomes to address the gap in practice. I address the results of the evaluation using the AGREE II tool by a panel of experts. I also discuss limitations that impacted the outcome of the project along with implications for the HD community and social change.

## Section 4: Findings and Recommendations

### **Introduction**

The purpose of the DNP HD project was to address the nursing problem that existed in the HD unit where this DNP HD project took place: There was no strict adherence to infection prevention policies. The policies that were in place were not cohesive, which made them difficult to be followed consistently, and there was no method to monitor the steady use of these policies. The DNP HD bundle (Appendix B) was created and introduced to the HD unit leadership to answer the practice question: What evidence based clinical practice guidelines can be developed and validated regarding risk reduction of blood stream infection in patients receiving hemodialysis? I found the literature does support the use of bundling; hence, I developed a bundle with an auditing component for infection control practices in the HD unit. The project's introduction has led to a new approach in the assurance that staff is adhering to the appropriate infection control practices when initiating HD treatment. I completed a literature review to ascertain evidence-based support for the creation of the DNP HD and audit tool. The literature matrix was used to organize the evidence and rate the strength of the studies. The AGREE II tool (2017) was used to evaluate the DNP HD and audit tool.

In Section 4 I address the implications to nursing practice and findings of the evaluation of the expert panel, which are recommendations on how to address the gap in practice where the current policies are not cohesive and do not follow the latest EBP and there was not an auditing tool in place to ensure staff compliance. I also present a discussion of limitations that impacted the outcome of the project. Finally, I discuss



implications for the HD community and the positive social change that should resulted from the project.

### **Findings and Implications**

The prevention of BSIs is paramount in providing high-quality HD care. A review of the literature supports the use of care bundles to improve the quality of care and improve the use of the essential components of clinical processes that have the potential to do great harm (Resar et al., 2012). The use of a bundle, found in the literature in other areas of nursing, has been demonstrated as an effective method of bringing together policies and procedures into a cohesive unit (Resar et al., 2012)., although there is not a bundle specifically for initiation of HD treatment. The bundle has the ability to dramatically reduce facility acquired BSIs, thus decreasing prolonged hospitalizations and reducing the cost of care. The use of bundles is recommended in the current literature as a method of increasing staff compliance with nursing processes and policies (Resar et al, 2012). Powers et al. (2016) described poor compliance rates that exist across nursing units with less than adequate use of eye protection, appropriate use of gloves, and handwashing before and after patient contact during the initiation of HD treatment. Garrick and Morey (2015) stated that HD staff washed their hands only 22% of the time before initiating dialysis and 19% of the time before caring for the bloodlines. To correct these shortcomings in the HD unit an evidence-based solution is needed. Utilizing the literature and agency recommendations, the DNP HD bundle (Appendix B) with the auditing tool (Appendix C) was created to streamline the current practices to focus on the period of high risk for infection transmission during HD, which is the introduction of needles for a fistula or graft when accessing the ports of a catheter. The DNP HD bundle

project with the auditing tool incorporated the TPB to create an intervention that enabled the standardization of the expectations and improved communication with the HD staff, which will allow them to comply with infection control best practices. With the introduction of the DNP HD bundle with audit tool, the staff participants will be given adequate control, power, and know-how of appropriate behaviors, allowing staff to see the consequences of breaches as an increase in BSIs (see Ajzen,1991).

The leadership of the inpatient and outpatient HD units along with the clinical nurse specialist were selected as expert appraisers because of their expertise in the area of dialysis care and being responsible for the creation, updating, and implementing new practice CPG in the setting. The bundle was introduced to these expert appraisers and after review of the DNP HD bundle with the auditing tool, they were informed that the results of their evaluation would remain anonymous and the location and name of the organization would be masked. To assess the validity of the created HD bundle, an evaluation team appraised the guideline using the AGREE II tool (Appendix D). The AGREE II tool is most commonly used for appraisal of new CPGs to document validity (Brouwers et al., 2010). The tool contains 23 criteria organized within six domains. The questions were rated on a 7-point scale with 1 being strongly disagree to 7 being strongly agree. The scores of each domain were totaled and then the scores of the individual items were divided by the maximum possible score and expressed in a percentage (AGREE II Tool, 2017). The domain score totals for the evaluation team were as shown in Table 1.

Table 1

*AGREE II Clinical Guideline Evaluation Tool Scores*

Evaluator	Domain 1 Scope and Purpose	Domain 2 Stakeholder Involvement	Domain 3 Rigour of Development	Domain 4 Clarity of Presentation	Domain 5 Applicability	Domain 6 Editorial Independence	Overall Guideline Assessment
	63/63	63/63	164/168	82/84	101/105	42/42	21/21
1	21	21	56	28	35	14	7
2	21	21	56	28	35	14	7
3	21	21	52	26	31	14	7
Percentage	100	100	97	98	96	100	100

**Domain 1**

Domain 1 of the AGREE II tool addressed the scope and purpose of the guideline. There were three questions that addressed the target population the CPG will serve along with the guideline objectives. The total score for this domain was 100%. This indicates that the experts agreed that the objectives of this CPG were met. There were no questions or suggestions for improvement in this domain; all three experts stated that the purpose and aim of the CPG was achieved and the target population, along with clinical concerns, were clearly identified.

**Domain 2**

Domain 2 of the AGREE II tool addressed stakeholder involvement with three questions that focused on the creation of the CPG, target users of the guideline, and if the views and preferences of the target population were taken into consideration. The total

score for this domain was 100 % which shows a consensus that the involvement of the stakeholders was appropriate.

### **Domain 3**

Domain 3 of the AGREE II tool addressed the rigor of development with eight questions that focused on the search for evidence and the process used to formulate the guideline recommendations. The score for this domain was 97% reflecting that the experts agreed that the creation of this CPG expanded the knowledge base of the evaluation team and appropriate processes were followed to ensure the creation of a high-quality CPG. One evaluator commented that when introducing new EPB into practice there was always room for improvement and a perfect score on every question would not portray that thought.

### **Domain 4**

Domain 4 of the AGREE II tool addressed the clarity of the presentation with three questions on CPG recommendations being identifiable and specific. The overall score for this domain was 98%, demonstrating that the CPG presentation was clearly understood. All three evaluators commented that the presentation was easy to follow and would assist in the implementation of the CPG. One evaluator deducted points to leave room for improvement.

### **Domain 5**

Domain 5 of the AGREE II tool addressed the applicability of the CPG with four questions that were focused on the barriers to implementation of the CPG, integrating it into practice, and the process for monitoring and auditing the guideline in the future. The total score for this domain was 96% which reflected that the CPG would be applicable to

practice. Points were deducted for the transferability to the ICUs to leave room for the staff's comments on revisions and that I be a full participant in its implementation.

### **Domain 6**

Domain 6 of the AGREE II tool addressed the editorial independence with two questions that were focused on competing interests and possible influences from funding bodies. There was no funding required for this project. The total overall score for this domain was 100%. There were no comments or suggestions offered for this domain

### **Overall Assessment of Guideline**

The final overall assessment score for the CPG was 100% with all appraisers stating that they would recommend the CPG for use as presented. Two of the appraisers commented that this would improve communication with practice expectations. All three said the monitoring tool would provide valuable information on areas to place the focus of staff education.

The three evaluators were given an opportunity to provide additional comments. One evaluator stated that "the implementation of this tool will streamline a cumbersome process and provide an opportunity to give feedback to staff while breaking old habits". Another comment was that the project was based on the current recommended guidelines for HD care and supported by the evidence and is entirely applicable to the HD patient. The third evaluator commented that "the auditing increases awareness and enhances knowledge. The tool will allow the unit to access and improve practice. It also will create a culture that embraces quality improvement." The expert panel gave excellent scores and positive comments regarding the development of the HD bundle.

There is a need to continually find methods that improve the BSI rate in the HD population. The bundle approach is an innovative method of combining policies and procedures to provide the best available care, providing staff with a method to take ownership of infection prevention in the HD unit while giving leadership a method of assuring compliance with CPGs. Through implementation of the HD bundle, it is anticipated that BSI in the HD population at this free-standing HD clinic will decrease, improving quality of life for the patients on HD and decreasing loss of revenue for the facility, thus creating a positive social change.

### **Recommendations**

The priority recommendation resulting from the findings of the DNP HD project is to implement the bundle to address the gap in practice where the current policies on infection control in the HD unit were not cohesive, which made them difficult to be followed consistently. After the DNP HD project has been completed, there will be a plan made to introduce the staff to the new infection prevention CPG with me leading the post-project dissemination. Additionally, a significant recommendation from the education department related to this DNP project was the use of the audit tools as a method to gather compliance data on infection control practices by staff during the initiation of an HD treatment. The proposed recommendation would be to do an initial evaluation of staff prior to the introduction of the DNP HD bundle and then introduce the staff to the HD bundle during an educational session as a new procedure when initiating HD treatment with any type of access, whether a CVC, fistula, or graft. At the education session, I would be present for the introduction and to clarify questions the staff may have. A copy of the HD bundle should be made available for staff reference. During the

initial phase of using the HD bundle, the nursing leadership, along with me, would be present to assist and give immediate feedback during breaches in practice. After the introduction of the bundle, the nursing leadership would monitor the staff replacing the routine hand hygiene monitoring that is done regularly on the unit. I recommend that when breaches in practice occur leadership respond to the learning opportunity by offering immediate feedback. The audit tool should be used over a period of a week, collecting data to demonstrate if there is any improvement in the infection control practices of the staff.

Collecting the pre and post auditing tool data will delay the implementation of the bundle but will provide evidence on the effectiveness of the bundle. Along with collecting the audit tool data, there should also be an initial and end comparison of patient infection rates. The expectation is that with increased compliance to infection control practices there will be a decline in facility acquired BSIs. There may also be times when unit activity may prevent the audit tool from being used as scheduled by unit leader.

### **Strengths and Limitations**

In the nursing profession, there must be a method of implementing new evidence into practice. The strength of this DNP HD project is that the use of bundles has the potential to improve the reliability and consistency of nursing care. The initial practice question addressed whether using a bundle approach can be an effective method of improving nursing care with the initiation of HD treatment supported by the latest evidence. The answer is yes, bundles have been successfully used in other areas of nursing; they have been recognized by the National Quality Forum and placed on their list of endorsed safe practices (Resar et al., 2012). The latest evidence in HD care can be

organized using these elements to redesign work and improve communication with an anticipated outcome to decrease the patient infection rate in the HD unit. Another strength was that the HD bundle project had the full support of nursing leadership and will extend beyond the project to be incorporated into daily practice in the outpatient and inpatient unit. The limitations of the project were that there was not a bundle found in the literature for the initiation of treatment, although it is supported throughout the literature. Also, the CPG has general applicability, but when transferring to other units such as intensive care, these units may need to modify the processes for using the CPG.



## Section 5: Dissemination Plan

Research findings have contributed to many advances in medicine and public health initiatives. Often, however, improved health care practices and more effective prevention efforts based on new research knowledge are delayed by incomplete communication of research results. In fact, many people view the appropriate distribution of research findings as an ethical obligation of researchers and research institutes (Hagan, Schmidt, Ackinson, Murphy, & Jones, 2017).

The advancement of nursing practice is vital to the future of nursing (Institute of Medicine, 2011). Dissemination of the DNP HD bundle project is the expansion of knowledge in the science of infection prevention. Key findings should be disseminated appropriately among all relevant community groups, including those who have collaborated in research, new practices, and programs and could benefit by implementing the findings. The dissemination of the DNP HD bundle could improve the delivery and quality of care by reducing harm to patients. The DNP project will be beneficial to other areas of nursing that provide HD care because it can be adapted to meet the specific needs of the unit. Also, the changing needs of the HD population requires a broader focus on the redesign of health care and the prevention of BSIs (Strech & Wyatt, 2013).

Plans are being made to introduce the staff to the new infection prevention CPG with me leading the post project dissemination. After the effectiveness of the DNP HD bundle is demonstrated in the HD unit, it will be introduced to the education staff, the quality improvement team, and nursing leaders in the intensive care units that also care for HD patients. This will allow dissemination throughout the facility and open the door

to the possibility of sharing the CPG with other units in our network that serve the HD population.

Presentation at the National Kidney Foundation Renal Symposium would be an appropriate venue to introduce the project to the surrounding area dialysis community. Publication of the project in a professional nursing journal like *The Nephrology Nursing Journal* would be another appropriate venue to introduce the DNP HD bundle to reach nursing professionals responsible for HD care throughout the wider HD community; the journal is published quarterly and reaches thousands of subscribers, including nurses at all levels of practice and HD technicians. I will also submit my abstract for a presentation for the American Organization for Nursing Leadership for the 2020 conference.

### **Analysis of Self**

As a DNP student, I have developed my skills in evaluating research and applying that science to clinical problems to improve patient health care outcomes. Since the beginning of my DNP project, I have refined my ability to analyze the current literature and find the best possible answer to address a clinical practice problem. Through the development of the DNP project, my scholarly writing has improved immensely. The research, knowledge, education, and writing skills I have gained will become a valuable asset to the organization as I continue to evaluate and introduce the latest evidence into practice. Through the process of being mentored, I have also learned that I have the ability to mentor others through the evidence to practice journey. With the advancement of my education, I can continue to be an agent of social change in the nursing profession. My plan for the future of this project is to gather data to determine its effectiveness and assist in adopting it as a policy throughout the hospital network. The creation of the DNP

bundle project has taught me to look at my work environment with discernment and evaluate changes that could benefit the patient, organization, and staff through innovative in-care processes through the introduction of new clinical practice guidelines.

### **Nurse Scholar**

The DNP project is a synthesis of academic work that provided the opportunity to apply the DNP Essentials, I, II, III, VII and VIII. I used scientific underpinnings to create a deliverable product that used analytical methods to provide the organization with an EBP solution to improve the health of the HD population. This demonstrated the abilities of an advanced practice nurse with knowledge in the translation of evidence into practice (American Association of Colleges of Nursing, 2006). Through this experience as a scholar, I have learned that the use of EBP can impact the delivery of care as well as patient outcomes.

The DNP HD bundle has opened opportunities for the advancement of nursing practice through the creation of new practice standards. This supports the Institutes of Medicine's (2010) claim that nurses should examine innovative solutions related to care delivery by focusing on nursing and the delivery of nursing services. Also, nurses should achieve higher levels of education and training through an improved education system that promotes seamless academic progression. The creation of the DNP HD bundle has given me the opportunity to promote the sharing of knowledge, skills, and ideas in order to create clinical practice solutions.

The DNP project has also equipped me with leadership skills that will benefit me in helping staff to understand nursing's effect on the overall health of the HD population. The current policies did not give staff the information needed to perform at expected

standards. There were challenges in finding an evidence-based solution to a long-standing problem in HD care, but I had confidence that the solution was in the literature and agency recommendation. Finding a viable solution has given me insight and understanding of the change process in nursing. The completion of this project is an opportunity to set goals for the future and a commitment to lifelong learning and advancing the nursing profession. I have gained a new appreciation of process improvement and EBP to ensure that changes are supported by science. The doctoral project has impacted my growth as a leader and practitioner. It has also provided an opportunity to investigate and implement new practices that are not currently used in the HD unit but have the potential to improve patient outcomes and can be transferred into practice. There were a few challenges in the beginning of the project because the idea of bundling policies and procedures has only been implemented when caring for a patient with a CVC in HD. The first literature search was difficult, but the idea of bundling HD policies and procedure became clearer as I continued to search. The insight that I gained from this project was to never give up. The answers are there, it is only a matter of knowing where and how to search for them. The arena for EBP is limitless, and now it is only a matter of willingness that will keep me from finding the answer to the next clinical problem.

### **Summary**

The prevention of BSIs in the HD setting is an integral component of patient care. When infection prevention policies are not cohesive it is difficult for staff to perform at expected standards. I was challenged with the task of finding evidence-based solutions to prevent BSIs in the HD unit that started with a search of the literature and agency

recommendations. Through this evaluation I was able to find the latest evidence available and combine the recommendations to create the DNP HD bundle with an auditing tool. The development of this CPG gives staff clear concise instructions of infection prevention practices when initiating HD treatment along with a method that allows nursing leaders to monitor the consistency of care. The creation of the DNP HD bundle and audit tool also brought about a new approach to communicating expectations of staff when initiating HD. Leadership involvement through feedback using the audit tool brings hope to promote an environment that will limit the barriers to infection prevention, practices adherence, and allow staff to take ownership and assist in the redesign of the unit's culture (see Kretzer & Larson, 1998).

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Paterson, D. (2015). Using a theory of planned behavior framework to explore

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## Appendix A: Literature Review Matrix

Full Reference	Theoretical/ Conceptual Framework	Research Question(s)/ Hypotheses	Research Methodology	Analysis & Results	Conclusions	Grading the Evidence
Agar, J. W. (2015). Reusing and recycling dialysis reverse osmosis system reject water. <i>Kidney International</i> , 88(4), 653-657. <a href="https://doi.org/10.1038/ki.2015.213">https://doi.org/10.1038/ki.2015.213</a>	n/a	Standard for water purification in hemodialysis. Used for definition of terms.	n/a	Water purity is significant to safe effect dialysis treatment.	Where at home or in-center water purity must be verified before hemodialysis is initiated.	VII
Agency for Healthcare Research and Quality. (2017). Healthcare-associated infections. Retrieved from <a href="https://health.gov/hcq/prevent-hai.asp">https://health.gov/hcq/prevent-hai.asp</a>	n/a	n/a	n/a	Expert opinion on health care-associated infections.	n/a	VII
Ajzen, I. (1991). The theory of planned behavior. <i>Organizational Behavior and Human Decision Processes</i> , 50(2), 179-211. <a href="https://doi.org/10.1016/0749-">https://doi.org/10.1016/0749-</a>	Theory of planned behavior	Intentions to perform behaviors of different kinds can be predicted with high accuracy from attitudes toward the behavior.		Intentions to perform behaviors of different kinds can be predicted with high accuracy from attitudes toward the behavior.	When given power and ability behavior changes will occur	n/a

5978(91)9002 0-T						
Centers for Disease Control and Prevention. (2011). Eliminating healthcare-associated infections: State policy options, 1-34. Retrieved from <a href="https://www.cdc.gov/hai/pdfs/toolkits/toolkit-hai-policy-final">https://www.cdc.gov/hai/pdfs/toolkits/toolkit-hai-policy-final</a>	n/a	n/a	n/a	Expert opinion on eliminating infections in a hemodialysis unit.	n/a	VII
Chamberlain, D. J., Willis, E. M., & Berstein, A. B. (2011). The severe sepsis bundle as processes of care: A meta-analysis. <i>Australian Critical Care, 24</i> (4), 229-243. <a href="http://dx.doi.org/10.106/j.aucc.2011.01.003">http://dx.doi.org/10.106/j.aucc.2011.01.003</a>	System's model	Does the sepsis 24-hour bundle improve patient survival?	Systematic Review (Literature review)	There was an analysis of 21 studies that recorded results of a sepsis protocol before and after the intervention using the bundle.	18 out of the 21 studies show a decrease in patient mortality associated with the utilization of a sepsis care bundle.	Level I.
Denton, A., Topping, A., & Humphreys, P. (2016). Evolution of an audit and monitoring tool into an infection prevention and control	Constructivist grounded theory	To examine the mechanisms through which the implementation of a monitoring tool influenced the care and management	Qualitative study	Participants recognized that the reporting process had positively influenced the care received by patients.	The use of auditing and monitoring tools as part of a daily review process may enable staff to improve patient outcomes and achieve	Level V

process. <i>Journal of Hospital Infection</i> , 94(1), 32-40. <a href="https://doi.org/10.1016/j.jhin.2016.04.017">https://doi.org/10.1016/j.jhin.2016.04.017</a>		of patients,			the required levels of environmental hygiene through group interaction, education, and collaboration.	
Fram, D., Taminato, M., Ponzio, V., Manfredi, S. R., Grothe, C., Assayag Batista, R. E., ... Barbosa, D. (2014). Risk factors for morbidity and mortality of bloodstream infections in patient undergoing hemodialysis: A nested case-control study. <i>BMC Research Notes</i> , 7(1), 144-159. <a href="http://dx.doi.org/10.1186/1756-0500-7-882">http://dx.doi.org/10.1186/1756-0500-7-882</a>	Practice theory.	What are the risk factors related to BSI that increase the mortality and morbidity in hemodialysis patients?	Nested control study.	93 patients were followed retrospectively to determine the cause of their BSI. Patients with BSI caused by staph aureus had a 8.67 times higher chance of progressing to death or a prolonged hospitalization.	The findings indicated that hemodialysis patients had an increased risk of bloodstream infection (BSI). This increased their mortality and morbidity. This is highly preventable through strict infection control procedures.	Level II
Fitzgibbons, L. N., Puls, D. L., MacKay, K., & Forrest, G. N. (2011). Management of gram-positive coccal bacteremia and hemodialysis. <i>American</i>	n/a	What is of management of these infections in hemodialysis based on the organism and its susceptibility profile, including access management.	Randomized control study	Strong infection control policies in the hemodialysis unit are the key to infection prevention.	When there is conversion from catheter to arteriovenous access when possible and appropriate use essential factors in the prevention	Level II



<i>Journal of Kidney Disease</i> , 57(4), 624-640. <a href="http://dx.doi.org/10.1053/j.ajkd.2010.12.013">http://dx.doi.org/10.1053/j.ajkd.2010.12.013</a>					of bloodstream infections.	
Fleischer, A. R., Semenic, S. E., Ritchie, J. A., Richer, M., & Denis, J. (2016). Nursing unit leaders' influence on the long-term sustainability of evidence-based practice improvements. <i>Journal of Nursing Management</i> , 24(3), 309-318.  <a href="https://doi.org/10.1111/jonm.12320">https://doi.org/10.1111/jonm.12320</a>	n/a	To describe how actions of nursing unit leaders influenced the long-term sustainability of a best practice guidelines.	A qualitative descriptive case study	As part of managing overall unit performance, unit leaders may influence practice improvement sustainability by aligning vision, strategies, and activities.	Unit leaders are required to strategically orchestrate efforts to achieve long-term sustainability of evidence-based practice improvements.	Level VI
Garrick, R., & Morey, R. (2015). Dialysis facility safety: Processes and opportunities. <i>Seminars in Dialysis</i> , 28(5), 514-524. <a href="http://dx.doi.org/10.1111/sdi.12395">http://dx.doi.org/10.1111/sdi.12395</a>	n/a	What steps can be taken to prevent unintentional human error.	n/a	Tools that emphasize the should standardization of policies should be considered for usability, and that high-risk processes should include manual "hardwired safety	Tools and strategies drawn from cognitive psychology, behavior modification, and human factor engineering can be utilized to better patient outcomes.	Level VII

				tools”.		
Gupta, N., Cannon, M., & Srinivasan, A. (2013). National agenda for prevention of healthcare-associated infections in dialysis centers. <i>Seminars in Dialysis</i> , 26(4), 376-383. <a href="http://dx.doi.org/10.1111/sdi.1209">http://dx.doi.org/10.1111/sdi.1209</a>	n/a	The presentation of the national action plan to prevent infections in hemodialysis	n/a	Even modest improvements in BSI infrastructure and infection control practices will significantly impact the health of hemodialysis patients.	hemodialysis patients are cared for by multiple providers. So, it is important to coordinate efforts to ensure that the prevention issues are addressed as comprehensively as all other health maintenance issues. Strategies to hold these care providers accountable for prevention should also be explored that dialysis care providers.	Level VII
Hess, S., & Bren, V. (2013). Essential components of an infection prevention program for outpatient hemodialysis centers. <i>Seminars in Dialysis</i> , 26(4), 384-398. <a href="http://dx.doi.org/10.1111/sdi.12102">http://dx.doi.org/10.1111/sdi.12102</a>	Milo’s framework for prevention.	What is the necessary component of an infection prevention program in hemodialysis ?	Case review Summary.	Analyzed the programs of acute care facilities with low infection rates in the hemodialysis unit.	1. The research gave practical applications of infection control in a hemodialysis unit. 2. Surveillance was considered a key element in the prevention of BSI.	Level IV

Institute for Healthcare Improvement . (n.d.). What is a bundle? Retrieved from <a href="http://www.ihio.org">http://www.ihio.org</a>	n/a	The effectiveness of bundling nursing care processes.	n/a	The concept of bundles is to help health care provide a more reliably delivery of the best possible care for patients undergoing particular treatments with inherent risks.	The power of a bundle comes from the body of science behind it. The bundle is well established practices. The method of execution is with complete consistency	Level VII
Jeong, S. Y., & Kim, K. M. (2016). Influencing factors on hand hygiene behavior of nursing students based on theory of planned behavior: A descriptive study. <i>Nursing Education Today</i> , 36, 159-164. <a href="https://doi.org/10.1016/j.nedt.2015.09.014">https://doi.org/10.1016/j.nedt.2015.09.014</a>	Theory of planned behavior	This study was conducted as survey research for examining nursing students' knowledge of hand hygiene, behavior beliefs, normative beliefs, control beliefs, and behavior, and identifying factors influencing their hand hygiene behavior.	Descriptive Study	The analysis showed that positive behavioral beliefs and strong control beliefs are also needed to increase hand hygiene compliance .	The results suggested that knowledge is not enough to change the beliefs related to hand hygiene.	n/a
Karkar, A., Bouhaha, B. M., & Dammang, M. L. (2014). Infection control in hemodialysis units:	n/a	How to prevent infections in the hemodialysis unit.	n/a	The increased potential for transmission of infections in the HD settings led	To increase the awareness and encourage implementation among dialysis providers by	Level VII

<p>A quick access to essential elements.  <i>Saudi Journal of Kidney Diseases and Transplantation: An Official Publication of the Saudi Center for Organ Transplantation, Saudi Arabia</i>, 25(3), 496-519.  Retrieved from <a href="http://ezp.walidnlibrary.org">http://ezp.walidnlibrary.org</a></p>				<p>to the creation and implementation of specific and stricter infection prevention and control measures in addition to the usual standard precautions . Different organizations have generated guidelines and recommendations on infection prevention and control for implementation in the HD settings.</p>	<p>reviewing, extracting and comparing the essential elements of guidelines and recommendations on infection prevention and control in HD units.</p>	
<p>Kliger, A. S. (2015). Maintaining safety in the dialysis facility. <i>Clinical Journal of the American Society of Nephrology</i>, 10(4), 688-695.  <a href="http://dx.doi.org/10.2215/CJN.08960914">http://dx.doi.org/10.2215/CJN.08960914</a></p>	Practice theory.	Not a research study, expert opinion.	n/a	There was an examination of the factors that contribute to error in a hemodialysis unit.	Author gave outlines methods to prevent errors from occurring with hemodialysis.	Level VII
<p>Letizia, M. (2010). Infection prevention and control,</p>	n/a	n/a	n/a	History on infection prevention in nursing.	Nurses are frontline members of the health care team	n/a

starting with Flo. <i>MEDSURG Nursing</i> , 19(6), 315-316. Retrieved from <a href="https://eds-b-ebscohost-com.ezp.waldenlibrary.org">https://eds-b-ebscohost-com.ezp.waldenlibrary.org</a>					who must assume tremendous responsibility in the prevention and control of HAI.	
Lindberg, C., Downham, G., Bucell, P., Jones, E., Peterson, P., & Krebs, V. (2013). Embracing collaboration: A novel strategy for reducing bloodstream infections in outpatient hemodialysis centers. <i>American Journal of Infection Control</i> , 41(16), 513-519. <a href="http://dx.doi.org/10.1016/j.ajic.2012.07.015">http://dx.doi.org/10.1016/j.ajic.2012.07.015</a>	Intervention theory.	Will the implementation of a panel of infection prevention strategies decrease the infection rate in a hemodialysis unit?		Eight infection prevention strategies were combined into one prevention strategy. The infection rate was monitored over prior to implementation and post implementation from 2009 to 2011.	The study showed a decrease in the infection rate from 2.04 per 100 patient months to 0.75. The study also demonstrated a change in the behavior of staff toward infection control practices.	Level 1
McCann, M., Clarke, M., Mellotte, G., Plant, L., & Fitzpatrick, F. (2013). Vascular access and infection prevention and control: A national	n/a	What are standard infection control practice in a hemodialysis unit.	Descriptive study	The patients at highest risk for BSI where units that did not have surveillance protocols in place.	Infection prevention and control should be underpinned by the best available evidence; but guidelines and recommenda	Level VII

survey of routine practices. <i>Clinical Kidney Journal</i> , 6(2), 176-182. <a href="http://dx.doi.org/10.1093/ckj/sft020">http://dx.doi.org/10.1093/ckj/sft020</a>					tions still need to be incorporated into routine care.	
McCarron, K. (2011). Understanding care bundles. <i>Nursing Made Incredibly Easy</i> , 9(2), 30-33. <a href="http://dx.doi.org/10.1097/01.NME.0000394024.85792.42">http://dx.doi.org/10.1097/01.NME.0000394024.85792.42</a>	Intervention theory.	There is no research question.	Research was not conducted.	Denies the care bundles and how it is utilized.	n/a	Level VII
Nightingale, F. (1863). <i>Notes on Hospitals</i> . Retrieved from <a href="https://ia601401.us.archive.org/21/items/notesonhospital01nighgoog/notesonhospital01nighgoog.pdf">https://ia601401.us.archive.org/21/items/notesonhospital01nighgoog/notesonhospital01nighgoog.pdf</a>	n/a	n/a	n/a	Nurse have always been scientist to improve infection control and prevention practices.	As nurse we must stand on the forefront to do no harm to patients through utilization of the best science available.	Level VII
Powers, D., Armellino, D., Dolansky, M., & Fitzpatrick, J. (2016). Factors influencing nurse compliance with standard precautions.	Health belief model	Is most effective means of preventing <u>blood borne pathogen</u> transmission through adherence to <u>standard</u> precautions or must more	Descriptive correlational study	There was a significant relationship between susceptibility of HCV and compliance with infection control	Understanding reasons for noncompliance will help determine a strategy for improving behavior programs that targets the aspects	Level V

<p><i>American Journal of Infection Control</i>, 44(1), 4-7.  <a href="https://doi.org/10.1016/j.ajc.2015.10.001">https://doi.org/10.1016/j.ajc.2015.10.001</a></p>		be done?		practices.	that were less than satisfactory to improve overall compliance. It is critical to examine factors that influence compliance to encourage those that will lead to total compliance and eliminate those that prevent it.	
<p>Pronovost, P. J., Marsteller, J. A., &amp; Goeschel, C. A. (2011). Preventing bloodstream infections: A measurable national success story in quality improvement. <i>Health Affairs</i>, 30(4), 628-634.  <a href="http://dx.doi.org/10.1377/hlthaff.2011.0047">http://dx.doi.org/10.1377/hlthaff.2011.0047</a></p>	n/a	Do the increase in evidence-based programs prevent HAI?	n/a	Programs that have aligned efforts to reduce infections have been successful	The program has demonstrated that its components can be applied to reduce other types of preventable harm	Level VII
<p>Rebmann, T., &amp; Barnes, S. (2011). Preventing infection in hemodialysis: An executive summary of the APIC elimination guide. <i>American Journal</i></p>	Practice theory.	Not a research study	Peer-reviewed professional organizational standards.	Concludes that a priority in hemodialysis unit must be policies and procedure that in place for the prevention of BSIs	A brief overview of APIC guidelines for infection prevention in hemodialysis units.	Level VII

<i>of Infection Control</i> , 39(1), 72-75. <a href="http://dx.doi.org/10.106/j.ajic.2010.08.012">http://dx.doi.org/10.106/j.ajic.2010.08.012</a>						
The Joint Commission. (2018). <a href="https://www.jointcommission.org/issues/article.aspx?Article">https://www.jointcommission.org/issues/article.aspx?Article</a>	n/a	n/a	Professional and organizational information	That hemodialysis is a high-risk area of practice and processes must be in place to assure there is no harm to the patient.	Dialysis units will be a major focus on policies and procedures in place to safe guard patients with hemodialysis care.	n/a
Ulrich, B., & Manning-Crider, N. (2017). Using teams to improve outcomes and performance. <i>Nephrology Nursing</i> , 44(2), 141-152. Retrieved from <a href="http://eds.b.ebscohost.com.ezp.waldenulibrary.org">http://eds.b.ebscohost.com.ezp.waldenulibrary.org</a>	n/a	How peer initiatives and teams impact quality outcomes	Professional organization	Using teams and peer-based initiatives improve outcomes and performance in the hemodialysis unit.	Creating teams allows the organizations to exponentially multiply resources and outcomes	Level VII
Ward, D. J. (2012). The application of the theory of planned behavior to infection control research with nursing and midwifery students. <i>Journal of</i>	Theory of planned behavior	The demonstration of the application of the theory of planned behavior and how it can affect the staff's infection prevention Practice.	Qualitative study	From this study was learned that the three predictors of intention can be influenced between students and their education in practice	Therefore, it is most likely to impact on their intention and in turn their behavior.	Level V



<p><i>Clinical Nursing</i>, 22(1/2), 296-298.  <a href="https://doi.org/10.1111/j.1365-2702.2012.04327.x">https://doi.org/10.1111/j.1365-2702.2012.04327.x</a></p>				<p>of infection control. Therefore, it is most likely to impact on their intention and in turn their behavior.</p>		
<p>Whelchel, C., Berg, L., Brown, A., Hurd, D., Koepping, D., &amp; Stroud, S. (2013). What's the impact of quality bundle at the bedside? <i>Nursing</i>, 43(2), 18-21.  <a href="https://doi.org/10.1097/01.NURSE.0000437481.30251.e1">https://doi.org/10.1097/01.NURSE.0000437481.30251.e1</a></p>	n/a	<p>What is the impact of quality bundles at the bedside?</p>	<p>Quantitative and Qualitative study</p>	<p>The quantitative data show that nurses that use bundle were able to complete patient care requirements 58% of the time. Arise from 16% pre-bundle implementation. The qualitative data showed that nurses who were aware of the bundle components completed the requirements for patient care most of the time.</p>	<p>Workflow assessments, embedded reminders, checklists, and improved data transparency at the bedside are needed to improve quality compliance.</p>	<p>Level V</p>
<p>White, K. M., Jimmieson, N. L., Obst, P. L., Graves, N., Barnett, A., Cockshaw, W., ... Paterson, D.</p>	<p>The theory of planned behavior framework to explore hand hygiene beliefs at the '5 critical</p>	<p>To explore hand hygiene beliefs at the '5 critical moments' among Australian hospital-based nurse.</p>	<p>Qualitative study</p>	<p>Peer-based initiatives to foster a sense of shared responsibility, and management-driven solutions to</p>	<p>The belief base of the theory of planned behavior provides a useful framework to explore systematical</p>	<p>n/a</p>

<p>(2015). Using a theory of planned behavior framework to explore hand hygiene beliefs at the '5 critical moments' among Australian hospital-based nurse. <i>BMC Health Services Research</i>, 15(59), 1-9. <a href="https://doi.org/10.1186/s12913-015-0718-2">https://doi.org/10.1186/s12913-015-0718-2</a></p>	<p>moments' among Australian hospital-based nurse.</p>			<p>tackle the non-compliance with hand hygiene.</p>	<p>ly the underlying beliefs of nurses' hand hygiene decisions according to the 5 critical moments.</p>	
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Reference:

Fineout-Overholt, E., Melnyk, B., Stillwell, S., & Williamson, K. (2010). Critical appraisal of the evidence: Part I an introduction to gathering, evaluating, and recording the evidence. *American Journal of Nursing*, 110(7), 47-60. <https://doi.org/10.1097/01.NAJ.0000383935.22721.9c>

## Appendix B: Hemodialysis Infection Control Bundle

Statement: Hemodialysis patients are at an increased risk of acquiring bloodstream infections, resulting in serious consequences for patients, staff, and the healthcare organization.

Objective: To optimize care while improving infection control practice by staff.

The nurse, in the initiation of HD treatment, will:

1. perform hand hygiene using the WHO, five moments of hand hygiene
2. wear appropriate personal protective equipment (PPE):
  - a. gloves
  - b. gown
  - c. mask
  - d. eye goggles
3. perform cleansing of the fistula or graft with chlorhexidine swab scrubbing 30 seconds, allowing to air dry before cannulation.

### **For central venous:**

- 1a. for dressing change, change gloves after dressing removal.
- 2a. to access, scrub the caps for 15 seconds. Allow to air dry
4. then remove caps and scrub the hub with chlorhexidine swab for 15 seconds, allow to air dry, no further contact with site.
5. connect bloodlines to HD access aseptically.
6. remove PPE and perform hand hygiene before caring for the next patient.

Adapted from:

Centers for Disease Control and Prevention. (2017). Dialysis safety. Retrieved from

<https://www.cdc.gov/dialysis/prevention-tools/audit-tools.html>

## Appendix C: Bundle Auditing Tool

(Use a “√” if the action performed correctly, a “Φ” if not performed. If not observed, leave blank)

Hand hygiene performed correctly	Correct PPE	Clean gloves after dressing removed	Site antiseptic applied appropriately	Site antiseptic allowed to air dry	No contact with the site after antiseptis	Cannulation or CVC access performed aseptically	Connect to bloodlines aseptically	Remove PPE and perform hand hygiene	Missed opportunity

Adapted from:

Centers for Disease Control and Prevention. (2017). Dialysis safety. Retrieved from

<https://www.cdc.gov/dialysis/prevention-tools/audit-tools.html>

## Appendix D: AGREE II Tool for Evaluation of Clinical Practice Guideline

Rating Scale: (1) Strongly Disagree, (2) Disagree (3) Partially Disagree, (4) Neutral, (5) Partially Agree, (6) Agree, (7) Strongly Agree

### Domain 1: Scope and Purpose

1. The overall objective if the guideline is specifically described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

2. The health question covered by the guideline is specifically described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

3. The population to whom the guideline is meant to apply is specifically described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

### Domain 2: Stakeholder Involvement

4. The guideline evaluators include individuals that are considered experts.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

5. The views and preference of the target population have been sought.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

6. The target users are clearly defined.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

### Domain 3: Rigour and Development

7. Systematic methods were used to search for evidence.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

8. The criteria for selecting the evidence are clearly described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

9. The strengths and limitations of the body of evidence are clearly described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

10. The methods for formulating the recommendations are clearly described

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

11. The health benefits, side effects, and risks have been considered in formulating the recommendations.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

12. There is an explicit link between the recommendations and the supporting evidence.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

13. The guideline has been externally reviewed by experts prior to its publication.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

14. A procedure for updating the guideline is provided.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

#### **Domain 4: Clarity of Presentation**

15. The recommendations are specific and unambiguous.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree



16. The different options for management of the condition or health issue are clearly presented.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

17. Key recommendations are easily identifiable.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

18. The guideline describes facilitators or barriers to its application.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

#### **Domain 5: Applicability**

19. The guideline provides advice and/or tools on how the recommendations can be put into practice.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

20. The potential resource implications of applying the recommendations have been considered.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

21. The guideline presents monitoring and/or auditing criteria.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

### **Domain 6: Editorial Independence**

22. The views of the funding body have not influenced the content of the guideline.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

23. Competing interests of guideline development group members have been recorded and addressed.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

### **Overall Assessment of Guideline**

24. I would recommend this guideline for use.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

### **Comments**

Appraisal OF guidelines for research & evaluation II. (2017). Retrieved from

<https://www.agreetrust.org/wp-content/uploads/2017/12/AGREE-II-Users-Manual-and-23-item-Instrument-2009-Update-2017>.

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Appendix E: Disclosure to Expert Panelist Form for Anonymous Questionnaires

***To be given to expert panelist prior to collecting questionnaire responses—note that obtaining a “consent signature” is not appropriate for this type of questionnaire and providing respondents with anonymity is required.***

***Disclosure to Expert Panelist:***

You are invited to take part in an expert panelist questionnaire for the doctoral project that I am conducting.

***Questionnaire Procedures:***

If you agree to take part, I will be asking you to provide your responses anonymously, to help reduce bias and any sort of pressure to respond a certain way. Panelists' questionnaire responses will be analyzed as part of my doctoral project, along with any archival data, reports, and documents that the organization's leadership deems fit to share. If the revisions from the panelists' feedback are extensive, I might repeat the anonymous questionnaire process with the panel of experts again.

***Voluntary Nature of the Project:***

This project is voluntary. If you decide to join the project now, you can still change your mind later.

***Risks and Benefits of Being in the Project:***

Being in this project would not pose any risks beyond those of typical daily professional activities. This project's aim is to provide data and insights to support the organization's success.

***Privacy:***

I might know that you completed a questionnaire but I will not know who provided which responses. Any reports, presentations, or publications related to this study will share general patterns from the data, without sharing the identities of

individual respondents or partner organization(s). The questionnaire data will be kept for a period of at least 5 years, as required by my university.

***Contacts and Questions:***

If you want to talk privately about your rights in relation to this project, you can call my university's Advocate via the phone number 612-312-1210. Walden University's ethics approval number for this study is 06-28-19-0363189.

Before you start the questionnaire, please share any questions or concerns you might have.