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Diabetes: Reducing Foot Ulcers through a Protocol Approach

In partial fulfillment of the requirements for the Doctor of Nursing Practice

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Abstract

Overview: Diabetic foot ulcers (DFU) is a phenomenon that affects both type I and type II diabetes. DFU screening, education, and prevention are highly important within the primary care setting; however, there was no protocol addressing care of DFUs at the project site.

AIM: The purpose of this project was to develop and implement a Diabetic Foot Ulcer Screening and Education Protocol (DFUSEP) at a project site. In addition, this protocol is to guide leadership and staff members alike in reducing DFU incidence.

Methods: The protocol was implemented in a primary care clinic over 5 weeks. Data was collected at pre-implementation and post-implementation.

Results: The implementation of a DFUSEP within the project site decreased DFU presence by 10%, DFU education was increased from 20% to 80%, and DFU screening rates increased to 70%. An overall vast improvement post implementation.

Conclusion: It was concluded at the end of the project that the implementation of the DFUSEP was shown to reduce foot ulcer incidence rates in the primary care setting in the time allotted. This project also concluded that the implementation of an evidence-based protocol increased the knowledge of staff members and leadership in order to meet the needs of diabetic patients in regards to DFU screening and education. In addition, the multidisciplinary team was properly educated and trained on the DFUSEP protocol. Although this project was statistically significant, there were limitations that may affect the results.

Diabetes: Reducing Foot Ulcers through a Protocol Approach

Diabetes Mellitus (DM) is a global problem. According to the World Health Organization (2018), those affected globally with DM has increased from 108 million in 1980 to 422 million people by 2014. One of the major complications associated with DM is foot ulcer development (American Diabetes Association, 2019). A diabetic foot ulcer is an infection, ulceration and/or destruction of deep tissues associated with neurological abnormalities and various degrees of peripheral vascular disease in the lower extremity (Sunny et al., 2018). In a global study performed it was noted that global diabetic foot ulcer prevalence was 6.3% occurring in both type I and II diabetics (Zhang et al., 2017). This is a significant complication that is highly preventable and treatable if integrated foot care is implemented (Bus & Van Netten, 2016).

Diabetic foot ulcers (DFU) is a phenomenon that affects both type I and type II diabetes; however, its prevalence is most likely to occur in type 2 diabetics. In a recent research article performed, it is stated that diabetic patients who had type II DM were 2.58 times more likely to develop diabetic foot ulcers than those with type I DM (Miriam et al., 2017). In addition, overweight diabetics, obese diabetics, those with neuropathy, and those who do not practice foot self-care are highly likely to develop foot ulcers. Some factors may contribute to foot ulcer development, which include a patient's lifestyle and behavior. If a patient is sedentary, they are more at risk due to being overweight or lack of circulation. Some common causes that put the diabetic at risk for foot ulcers include loss of sensation to foot, decreased circulation, pressure or friction, or uncontrolled blood sugar (APMA, 2019). In other cases, many patients may not have the means to medical treatment (Barshes et al., 2013). Barshes et al. (2013) further states that barriers to implementation of DFU prevention and management included limited access to primary medical care, non-compliance, delayed diagnosis of DFU, and limited healthcare

resources.

The American Association of Diabetes Educators (2016) report performing learning needs assessments including health literacy and setting/prioritizing goals are included in the best practices by a diabetes educator. Due to the worldwide prevalence of DFU's, which is 6.3% (Zhang et al., 2017), it is important that guidelines are put into practice by leadership and staff alike to prevent the continued development or further complication of DFUs. Having guidelines in place will further decrease the problem and prevent it from becoming one.

Background

Diabetes has been a problem for centuries along with one of its complications: foot ulcers. DFUs was initially presented during the mid-19th century and the treatment of choice at the time was prolonged bed rest (Naves, 2016). However, by the end of the 19th century Frederick Treves established the principles of foot ulceration treatment: sharp debridement, off-loading, and the importance of foot care and foot wear (Naves, 2016). These principles still stand true to this day as most recent research continues to support the data for essential treatment of debridement and off-loading (Mavrogenis et al., 2018). Today, the American Association of Diabetes (2019) has national guidelines in place for foot care that include: Prevention and caring for your feet. For prevention, patients should have their health care provider perform complete foot exams yearly (American Association of Diabetes, 2019). Patients with diabetes should also care for their own feet by checking their feet daily, becoming more active, using special diabetic shoes if needed, washing feet daily, have toenails trimmed correctly, wearing socks and shoes at all times, protecting feet from the hot and cold, and making sure you have good circulation (American Association of Diabetes, 2019).

Problem Statement

DFUs continue to pose a problem in the primary care setting due to decreased patient knowledge about the disease process and lack of education provided by leadership staff members (Emerson, 2006). Currently, at the DNP Project site, there is no protocol addressing care of DFUs. Additionally, no routine screening for DFUs when diabetic patients are seen for a routine visit or annual visits. However, there is education given to diabetic patients when they come in specifically for a diabetic problem. These specific components of evidence-based practice are lacking within the DNP project site as a lack of diabetes education is a barrier to the promotion of quality diabetes care (Emerson, 2006). Implementing a protocol approach can help reduce the DFU rates, improve screening rates, and increase staff/patient knowledge on DFU care and prevention. Formosa, Gatt, & Chockalingam (2016) state, guidelines are an essential component of achieving quality in the care of diabetes.

Purpose Statement

Diabetic patients are entitled to DFU education and prevention when they are first diagnosed, and during follow-up (Sen et al., 2015). Through this project, an evidence-based DFU Screening and Education Protocol (DFUSEP) will be implemented at the project site. The aim of this protocol is to guide leadership and staff members alike in reducing DFU incidence. Approximately 8%, or 1 in 12 patients, of diabetics in the project site has a DFU. After completing this project, the goal is to reduce the percentage to more than half of its current state. Moreover, this DNP project aims to increase staff knowledge on evidence-based approaches to DFU care and prevention.

Project Question

Will the implementation of DFUSEP reduce foot ulcer incidence rates in a primary care setting within a 5 week time frame?

Project Objectives

In the timeframe of this DNP Project, the project site will:

1. Develop an evidence-based DFUSEP designed to meet the needs of diabetic patients at the project site.
2. Implement a DFUSEP at the project site in the timeframe of the DNP Project.
3. Provide multidisciplinary staff education and training for the DFUSEP protocol prior to implementation of the DNP Project.
4. Develop a system for monitoring ongoing DFUs through EMR audits.
5. Reduce DFU rates by 4% and improve screening rates for DFU's by the end of the DNP Project.

Search Terms

To obtain information regarding this project, various search tool were used including search databases. These databases consisted of PubMed, CINAHL, MEDLINE as well as the Jay Sexter library at Touro University Nevada (TUN). In order to have recent data, filters were needed to remove old articles that do not pertain to practice. Filtering out literature that were older than 5 years would be excluded. Google Scholar is another search tool that is helpful as you can sort be relevance and date to provide most recent data articles.

In order to have a base on current practice within the project site, policies and procedures were reviewed. Currently, there are no guidelines in place at the project site for DFU assessment and management. With that said, this project will be able to implement a guideline for care.

Literature Review

A literature review was performed regarding the assessment and treatment of DFUs. Treatments can range from conservative to aggressive care. Through this review, information

will go further in depth on interventions for DFUs including vascular assessment, wound debridement, DFU wound dressings, glycemic control, and medical non-compliance.

DFU Assessment, Screening, and Prevention

Patients with diabetes are at risk of developing DFUs; therefore, screening should be done regularly to prevent future DFU development or recurrence. A foot examination includes taking a detailed history of foot ulceration or lower extremity amputation (Bus et al., 2015). The practitioner should also be looking for signs of DFU formation including callouses, blisters, poor fitting footwear, poor foot hygiene, or current foot infections (Bus et al., 2015). With the use of these screening tools the risks of developing DFUs including hospitalization can be minimalized. There are certain recommendations for assessment for patients who are at risk of developing DFUs. The International Working Group on the Diabetic Foot (IWGDF) recommends the following screening guidelines:

Category	Characteristics	Frequency
0	No peripheral neuropathy	Once a year
1	Peripheral neuropathy	Once every 6 months
2	Peripheral neuropathy with peripheral artery disease and/or a foot deformity	Once every 3–6 months
3	Peripheral neuropathy and a history of foot ulcer or lower-extremity amputation	Once every 1–3 months

(Bus et al., 2015).

Home Prevention

Immediate diagnosis and treatment is necessary for patients with DFU's. Monitoring for pre-ulcerative signs is important to prevent the foot ulcer. Pre-ulcerative signs may be the formation of a callus, blisters or hemorrhage (Bus et al., 2015). By removing the callus, it decreases plantar pressure that can lead to the DFU.

Prevention techniques that start with the patient include protecting their feet, avoid walking barefoot, and always using footwear whether inside the home or not (Bus et al., 2015). Due to the decreased sensation associated with peripheral neuropathy a diabetic patient may not know if they have stepped on something. Additionally, if they already have a DFU it can become worse as they do not know it is there while they walk barefoot or without footwear. The patient should be educated to monitor and inspect their feet daily as well as have good foot hygiene (Formosa, Gatt, & Chockalingam, 2016). Education is an effective form of DFU prevention; thus, education should be directed towards improving foot care knowledge and encouraging patients to be compliant with their foot care regimen. Another home monitoring technique includes skin temperature monitoring. Monitoring skin temperatures on a daily basis with the use of an infrared thermometer is effective over the standard treatment to prevent DFUs in high risk patients (Bus et al., 2015).

Some diabetics may need custom fitted diabetic shoes so that they fit properly and do not cause pressure. Prescribing therapeutic shoes with custom-made insoles can prevent a DFU or recurrent DFU because poor fitting footwear has been identified as an important cause of non-plantar foot ulceration, and have proven to effectively offload the foot (Bus et al., 2015).

Identifying Wound Infection

Wound infection will delay wound healing; therefore, recognizing the infection and

starting treatment with antibiotics in patients with DFU is crucial to improve outcomes (Everett & Mathioudakis, 2018). Infections can range from mild to severe, and treatment may also vary from oral antibiotics to IV antibiotics depending on the need. Prevention and treatment is imperative with infection as it may lead to amputation of the limb (Bader, 2008). When a wound is infected, the classic signs of inflammation include erythema, warmth around the affected site, pain, and functional decline (Swezey, 2015). On top of that, increased discharge with foul odor is another indicator of infection. These signs must be monitored to prevent further decline in wound status. Reassessing wounds frequently and diagnosing wound infections is vital in preventing prolonged hospital stays, sepsis, amputation or even death (Swezey, 2015).

Off-loading

Off-loading has been a DFU prevention and treatment hallmark since the 19th century. Relieving plantar pressure and shearing from a DFU is an important part of wound care, promotes wound healing and prevents recurrence (Everett & Mathioudakis, 2018). Off-loading is an evidence-based practice that can be achieved with a removable foot cast, which is used to reduce the amount of pressure onto the lower extremities. This type of practice has been ignored and can actually help to heal a DFU within a time frame of 6 to 8 weeks with proper adequate off-loading (Bus, 2016). Off-loading foot wear is usually modified to fit the patient properly and be made to alleviate pressure points from the foot. Diabetic shoes and inserts have also been effective in reducing plantar pressure and DFU recurrence.

Glycemic Control

Blood sugar control also has an effect on wound healing and prevention. Observational studies have found correlations with blood sugar control and wound healing, and those with good control of their sugar had a 35% reduction in risk of lower-extremity amputation (Everett &

Mathioudakis, 2018). During the year of 2013 and 2015, 172 patients were placed on a study to determine the amount of days to heal record while determining the Hb1Ac levels. While referring to this study it determined that patients who had a lower Hb1Ac level wound healed faster than those patients who had a high Hb1Ac (Dhatariya et al., 2018). Recent studies have shown that the majority of patients with poorly controlled diabetes and advanced stages of DFUs led to limb amputations (Almaramhy et al., 2018).

Wound Management

Wound Debridement

Prevention of DFUs is the best approach; however, when necessary, surgical debridement has been researched to be an effective treatment of choice. This procedure involves removal of necrotic tissue that affects the healing process (Everett & Mathioudakis, 2018). Everett and Mathioudakis (2018) further states that wound debridement allows new granulation tissue formation and re-epithelialization, which helps control infection. Surgical debridement is often thought of when necrotic tissue needs to be removed so that it may assist the healing process of the wound. Many times healthcare providers will refer to the DIME acronym to allow better preparation for wound management meaning D: debridement of nonviable tissue within the wound. I: Management of Inflammation and Infection. M: moisture control. E: environmental and Epithelialization assessment (Manna, Morrison, 2019). Studies have indicated that benefits of wound debridement include prolonging the life of patients and preventing lower limb amputations (Kavitha et al., 2014). Instruments to debride wounds such as a scalpel, curette, and tissue nippers are used to expedite healing of wounds. (Frykberg & Banks, 2015). Additionally, sharp debridement has been effective in several clinical trials (Game et al., 2016).

DFU Wound Dressings

Generally, DFUs will also benefit from a moist dressing that promotes granulation, autolytic processes, angiogenesis, and more rapid migration of epidermal cells across the wound base (Everett & Mathioudakis, 2018). A moist wound dressing has been clinically recognized as optimal for healing that controls the growth of microorganisms, allowing gaseous exchange, and thermally insulating the wound (Hilton et al., 2004). DFU would dressings will generally start with cleaning of the wound with normal saline to moisten the dressing that will cover the wound depending on the grade of the wound (Kavitha et al., 2014). The provider will then begin by selecting a topical regimen or device to help a wound heal more quickly. Some of these regimens may include hydrocolloids, foam, alginates, hydrogels, hyperbaric oxygen therapy or a wound vacuum there are several aided devices that can be utilized to assist the process of healing (Kavitha et al., 2014). In a study group of 10 patients with diabetes and DFUs, they were monitored every 3 days with the use of a wound VAC. It was concluded that the VAC was efficacious with the formation of granulation tissues (Ravari et al., 2013). Additionally, VAC therapy reduced hospitalization rate and duration of stay through outpatient treatment (Ravari et al., 2013).

Medical Non-Compliance

Literature review suggests that not all diabetic patients are following the standards of care. In addition, both patients and health care professionals play a role in improper wound healing as lack of awareness about diabetes, poor compliance to treatment regimen, poorly controlled blood sugar, delayed diagnosis and treatment all led to occurrence of DFUs (Muduli, Ansar, Panda, & Behera, 2015).

A lack of knowledge in diabetes and management is an issue that affects both patient and health professional. The Diabetic educator should serve as an expert and role model for teaching

patients on diabetes management and a role model for other health care professionals (American Association of Diabetes Educators, 2016). Non-compliant patients put themselves at risk for further decline in wound healing and possible limb amputation. A key benefactor to increased rates of morbidity and mortality is chronic poor metabolic and glycemic control (Polonsky & Henry, 2016). Patients who do not monitor their blood sugar on a regular basis may not know if they are uncontrolled; thus, leading to complications. Patients who do not know what their blood sugars are and if they are elevated may not seek medical attention at an early stage of diabetes. Delayed diagnosis and treatment resulted in limb amputation, mortality, and decreased healing rate as compared to early detection, treatment, and referral by the practitioner (Smith-Strom et al., 2017).

Vascular Assessment

Vascular assessment is another part of the standard of care to reduce DFU incidence. Approximately 40% of diabetics with peripheral arterial disease (PAD) are at higher risk of acquiring DFUs (Everett & Mathioudakis, 2018). Due to the decreased blood flow to the lower extremity and the susceptibility of forming DFUs, revascularization may be warranted. Revascularization of the limb is the treatment of choice for those with critical limb ischemia because it improves blood flow and restores compromised perfusion (Li et al., 2017). Improving blood flow to the lower extremity in patients with PAD will aid in the healing process due to greater perfusion.

A study concerning diabetes with PAD was performed in a sample of 14,685 patients to assess the outcome of revascularization (Wiseman et al., 2017). Methods included analyzing data from the Centers for Medicare and Medicaid Services Chronic Conditions Warehouse of patient demographics, clinical characteristics, enrollment, and provider claims. This concluded that

those who underwent revascularization had improved amputation rates as well as DFU healing (Wiseman et al., 2017).

Evidence Gaps

Although the treatment regimen may vary for certain degrees of DFUs, not all treatments are helpful. In a recent study regarding hyperbaric oxygen (HBO) therapy, it was suggested that this treatment would effectively aid in healing DFU's. However, this study manifested that HBO therapy was expensive and labor-intensive resulting in ineffective management of DFU (Brett, 2016). Other studies state that HBO therapy is cost-effective and associated with significantly higher rates of wound healing (Lipsky & Berendt, 2010). These studies are contraindicated towards one another and controversial.

Current Practice

DFUs will continue to be an issue within the diabetic community and will continue to need medical attention as patients develop DFUs. Currently there are guidelines in place to treat DFUs nationally; however, there are no recommendations on how to treat non-healing ulcers (Naves, 2016). By advancing the healing process through proper techniques in DFU treatment this can cause a large impact to decreasing healthcare costs and length of stays in hospitals. Current practice focuses on the healing process and how to meet guidelines within the DFU standards to treatment. Also, current practice must include versatile management, patient education, debridement, offloading, infection control, as well as the proper techniques to the standard of care initiated previous year (Braun et al., 2014).

Significance of Evidence to Profession

At the DNP Project site, there is no current protocol addressing care of DFUs. This poses a problem for the treatment and care of diabetic patients. DFUs affects the population locally and

nationally with an overall estimation of 8% of all diabetic Medicare beneficiaries have a DFU (Margolis et al., 2011). Moreover, about 15-25% of diabetic patients may develop a foot ulcer during their lifetime (Yazdanpanah et al., 2018). At the project site, providers do not check the feet of diabetic patients on a routine basis when they follow up. Questions may be asked whether the patient has a foot ulcer, but visualization is a better indicator if they truly have one or not. This affects nursing leadership because they should set the bar on assessment, diagnosis and treatment. They should be a guide to their staff members and to patients in managing this disease process. A guideline or protocol should be in place at the project site to ensure patients are properly taken care of and leadership staff members are aware of the current problem.

With the DFUSEP, prompt diagnosis and treatment will occur. Prolonged expert assessment will result in worsening DFUs with the worst clinical outcomes (Jeffcoate et al., 2018).

Theoretical Model

Historical Development

The Theory of Interpersonal Relations was written by nursing theorist Hildegard Peplau. Peplau attended Pennsylvania School of Nursing in 1931, earning her Bachelor's Degree in Interpersonal Psychology in 1943, her Master's and Doctoral degrees at Columbia University, and was also certified in psychoanalysis at the William Alanson White Institution of New York City (Petiprin, 2016). Her studies influenced her teaching as well as her development of the Theory of Interpersonal Relations in 1952. This theory was proposed to help nurses intervene more intelligently and sensitively in situations with patients (Washington, 2013). Additionally, the theory was developed due to the nurse-patient relationship and the need of nurses to understand and care for complex patients (Katherine, 2006).

Theory in Current Practice

In the healthcare field today, the Theory of Interpersonal Relations continues to make an impact on current practice. Peplau's theory relates to modern concepts of motivational interviewing, patient self-management, making informed decisions and patient engagement (D'Antionio, Beeber, Sills, & Naegle, 2014). Nurses and nurse practitioner's may use Peplau's theory in every day practice. When a patient seeks care nurses and providers are constantly listening to their concerns, builds a trusting patient-nurse relationship, educates the client regarding issues that concern them, applies evidence-base teaching, and when all has been performed the patient-nurse relationship is terminated after skills and self-management has been given (Gilkes, 2018).

This theory is applicable in current practice when it comes to diabetes and DFUs. Promoting patient self-care is a basis in the theory that puts the patient in charge of their health. A recent study using the Interpersonal Relations theory among patients with DM revealed improved fasting blood glucose and post prandial glucose resulting in significantly effective promotion for self-care management (Fernandes & Naidu, 2018). The theory can continue to guide change in current practice as we should hold our patients accountable for their health as well as staff members guiding them. By using this theory in practice both patients and staff members will have benefits including improved patient safety, team communication and to resolve conflicts (Lee & Doran, 2017).

Major Tenets of the Theory

Hildegard Peplau's theory of interpersonal relations is a middle range descriptive classification theory. In this theory, nurses should apply principles of human relations to the problems that may emerge at difference levels of experience (Nursing Theories, 2012). Peplau's

theory is a therapeutic process, which takes place when professionals partake in therapeutic relationships with those who are in need of health services (Hagerty, Samuels, Norcini-Pala, & Gigliotti, 2017). In order for success of a nurse-patient relationship, it must pass through three phases including orientation, working, and termination (Hagerty, Samuels, Norcini-Pala, & Gigliotti, 2017). Through this process and series of steps, the attainment of goal is achieved. This series of steps begins with the orientation phase when the nurse and patient meet. During the phase the needs of the patient are made aware through the nurse's assessment of the patient's health and situation (Petiprin, 2016). In this phase the client is seeking assistance regarding their illness with questions that they want to have answered. The nurse will then identify the problems and make a plan. During the identification phase the patient starts to feel accepted and also feels capable of dealing with the problem. The patient has a sense of belonging and has decreased feelings of helplessness and hopelessness (Nursing Theories, 2012). The third phase, exploitation, uses professional assistance for problem-solving and makes the patient feel like an important part of the helping environment (Petiprin, 2016). The patient continues to have an impact in their plan of care and healing process as they try to become independent.

Lastly, the resolution phase is the termination of the professional relationship due to the patient's needs being met through the collaboration of patient and nurse (Petiprin, 2016). In this last phase the therapeutic relationship is terminated as the goals have been met; thus, both nurse and patient continue to grow into maturity as they have both gained knowledge throughout the four phases.

Application to DNP Project

Diabetes may be an ongoing process for care, education, and healing. The Theory of Interpersonal Relations is an imperative part to helping patients with diabetes and DFUs. When a

patient is seen for their diabetic needs, the orientation phase, the nurse-patient relationship has begun; therefore, the first major tenet of applying principles of human relations has also begun. Staff members must keep in mind this tenet as they instruct patients on the DFUSEP. At any given level, staff members need to adapt to the circumstances given in regards to the needs of a patient as nursing is therapeutic and a healing art (Nursing Theories, 2012). The DFUSEP compares to the tenet of providing assistance to the sick individual because it is a guide. The staff members will utilize this protocol to counsel patients and integrate research based knowledge patient health. In order to do this, staff members need to be educated on the Theory of Interpersonal Relations and how it pertains to their work ethic and patient outcomes. Training regarding the roles of the nurse should be emphasized as they are teachers, resources, counselors, surrogates, and leaders (Nursing Theories, 2012). Before helping others, they should help themselves to be made fully aware of their duty to their patient. Successful integration of the DFUSEP at the project site begins with the staff members.

The major tenets of the theory will not only serve as a guide for the protocol, but will also continuously help develop the protocol to improve outcomes. Through the development of the protocol information is continuously obtained by the nurse to make a plan as well as include the patient in their plan of care. Trust will also be achieved through the identification phase as the patient feels they have a significant part in their treatment (Petiprin, 2016). During the exploitation phase the nurse/provider will seek further assistance from their counterparts in order to achieve the best outcome possible for the patient with a DFU. DFU care can be a long a tedious process depending on the compliance of a patient and the care received. The termination phase can either occur or not as diabetes requires life-long management and surveillance, which needs continuing medical care and patient self-management (ADA, 2019).

At the project site, the series of steps that Peplau discusses in her theory can be used to implement the DFUSEP protocol. From an organizational perspective the orientation phase would include all the staff members and leadership. They will all be oriented to the current problem of diabetics with and without DFUs. This phase will identify what service or care will be needed by the patient; in this case, prevention and treatment of DFUs. During the identification phase, leadership will identify and discuss to staff the problems associated with DFUs and why it is important to help assess, prevent, and treat them quickly. While in this phase the staff members will be able to develop a nursing care plan based on the patient's situation and goals (Petiprin, 2016). Additionally, in the identification phase everyone has a part in helping to deal with the stated problem. During the exploitation phase the leadership and staff members work in conjunction to analyze alternatives. All professionals involved will explore ideas to help each other understand the situation and start to implement protocol. In the final phase, resolution, leadership and staff members will disperse and begin to implement the protocol into their care and practice. They may continue to consult with one another, however, they will be implementing the protocol on their own; thus, they have all matured in this plan and development.

Project Design

This project will follow the model of a quality improvement project design. The overall purpose of the project implementation is to reduce DFU rates, increase provider and staff knowledge on DFUs, have a guideline for standardized practice, and improve overall patient health. The population of interest will be the staff who will undergo training for this project.

Training courses regarding the DFUSEP will be started with 2 hour classes either in the morning schedule or afternoon schedule. By having separate schedules, the staff members will

have multiple opportunities to attend the courses provided. The participants in the course will each be given the DFUSEP and paper to write questions or concerns they may have.

Educating the leadership, providers and staff members through in-house courses will help accomplish the project objectives of meeting the needs of diabetic patients, implementing the DFUSEP guideline, educating the staff, monitoring DFUs, and reducing the DFU incidence.

Population of Interest and Stakeholders

The direct population of interest will be the providers, leadership staff, and nurses that will benefit from the education given. This will include 3 staff leadership, 6 doctors/providers and 7 nurses in total. The sites leadership will have an active role in carrying out the education. Due to the leadership's authority, they will have an impact on guiding the implementation of the DFUSEP.

The indirect population of interest for this project are type I and type II diabetics. Both men and women will be included. All ethnic backgrounds may participate. Patients with co-morbidities will also be included to help assess the healing rates between patients without co-morbidities. Non-compliant patients will be excluded as the information obtained from them may not be a reliable source. Those under the age of 18 will also be excluded.

The setting will be a primary care facility where patients across the lifespan are seen, and where all diabetic patients will be seen and treated. The location of this facility is in the urban area of Bakersfield, California. Permission to conduct this project was granted by a site administrator in a written statement (Appendix A).

There are a variety of stakeholders involved in this project. The major stakeholders include providers, leadership, staff members, and patients. An initial meeting will be set up to establish rapport between all providers, leadership and staff members. This will allow all

members to be acquainted with one another as well as establish the purpose of the project.

Recruitment

Recruitment methods for attendance of the education event will include notices prior to the event, which will include flyers, emails, and word of mouth. These notices will include the date and time of the event. Also included for recruitment will be the added incentive of quarterly bonuses that will include cash bonuses for increased patient satisfaction, decreased hospitalization rates, and improved patient outcomes. The notices will state food and beverages will be offered during the education. These incentives will further assist in the recruitment for the event. Training will be interactive, so participants will all be included in the training and discussion.

Chart Review

In determining which charts will be reviewed in the electronic medical record (EMR), the search process will be conducted. Identifying charts by ICD-10, CPT, or billing codes will be helpful in the process of gathering the specific population needed. ICD-10 codes will include, but not limited to, E10.8, E11.8, E08.4, E08.5, E08.62, E08.621, E08.622, and E08.628. These ICD-10 codes are highlighted as they include type I and II diabetes with complications including neurological complications, circulatory problems, foot ulcers, and other skin complications. Inclusion criteria will include those patients with either type I or II DM, new onset DM, DM with and without complications, and those with foot ulcers related to DM.

Tools and Instrumentation

Tools that will be developed for this project include the DFUSEP, a PowerPoint for training staff, a recruitment flyer and email template (Appendix B). This will be a mandatory educational class that participants can either attend an 8 AM or 3 PM class. A chart audit tool

will also be used to conduct data analysis (Appendix E.

The DFUSEP will be the main tool utilized to guide clinical practice in this project (appendix D). This tool will be evidence-based, which will guide staff members in educating patients and screening for foot ulcers. Thorough research is required to develop the DFUSEP. Not all information is valid; thus, retrieving information from reliable resources is vital in developing an evidence-based guideline. Using valid resources such as peer-reviewed articles is a way to obtain valid information. The DFUSEP tool will be approved by the project team and leadership staff at the project site prior to implementation of the project.

Tools and instruments are needed to educate the staff. A PowerPoint is a great tool in providing the needed information to the participants (Appendix C). The PowerPoint will outline the DFUSEP and the need for this in practice. It will also include the background of DM, foot ulcers, and other complications associated with DM if not properly treated. It will include statistical information regarding the benefits of implementing a DFUSEP. Staff will be given education on where documentation should be addressed. Each participant will also be given an abstract of the presentation as an overview of what will be discussed. The speaker will be a tool of delivery, which may include myself as well as guest speakers who have specialized training in diabetic management. The project lead will develop a recruitment flyer and email template to inform staff of this training as discussed in the recruitment section.

The chart audit tool will be developed through information obtained in charts that are reviewed at the site. This will include necessary sections to review and ICD-10 codes to monitor for. The chart audit tool will be approved by the project team and leadership staff at the project site.

Data Collection

In the data collection process, patient charts will be reviewed to determine if the guideline was implemented to each patient associated with diabetes and/or DFU. Specific diagnoses/ICD-10 codes will be reviewed. As stated earlier, the codes will include E10.8, E11.8, E08.4, E08.5, E08.62, E08.621, E08.622, and E08.628, which indicate type I and II diabetes with complications including neurological complications, circulatory problems, foot ulcers, and other skin complications. These codes will best isolate the data collection for this project. During the first week staff members will be educated. At the time of training, attendance will be performed to determine how many providers were trained prior to implementation, and to ensure that all mandatory personnel were educated. During weeks 2-5 data collection will be performed to monitor for specific data points. A minimum of 20 charts of diabetic patients either type I/II with or without DFUs will be reviewed pre and post implementation. In order to improve DFU screening rates, charts will be screened for the presence of a DFU, documentation of DFU patient education, and documentation of a screening exam for DFU. Confidentiality will be maintained during chart reviews and access will be limited. Identifying those with a DFU will limit any discrepancies of chart review in comparison to those without. Screening for the proper documentation of DFU patient education will determine if this is being conducted during patient visits and if providers/staff members are compliant with documentation. Importantly, documentation of a screening exam for a DFU should be in the chart if this was performed. These three screening objectives will be performed during weeks 2-5.

Project Timeline

The timeline is of essence when carrying out this project. There is a small amount of time to incorporate all sections of the project, which includes the time to prepare the proposal, obtain approval for implementation, recruit participants, implement, collect data, and evaluate the

project. Obtaining approval for implementation will occur within the 2 weeks after completing all sections of the proposal. The original timeline proposed is to implement the DFUSEP within a 5 week time frame. This continues to be the goal for the project. Recruitment and education will begin during week 1 of the timeline. In weeks 2 through 5 data collection will ensue. Evaluation will occur during week 5. Timeline of the project is as follows:

Week/Date	Activity
Week 1 October 30-November 5, 2019	Staff will be trained on the DFUSEP by November 5, 2019.
Week 2 November 6-12, 2019	Data collection will be performed to monitor for specific data points. Minimum of 20 charts of diabetic patients either type I/II with or without DFU's will be reviewed pre and post implementation. Week 2 will focus on pre implementation.
Week 3 November 13-19, 2019	Data collection continues during week 3. Post implementation charts will be reviewed.
Week 4 November 20-26, 2019	Data collection continues into week 4.
Week 5 November 27-December 3, 2019	Evaluation of post implementation. Data analysis will be completed and compiled for review.

Ethical Protection

The protection of the subjects is of priority when conducting this project. Confidentiality is important for those within the project including the staff members in training as well as the patient charts selected for this project. This project will not involve direct care of patients; however, information from patient charts will be included in the education given to staff members. The staff members' participation in the study will have ethical conduct. Furthermore, the goal of informed consent is to provide sufficient information to the participants that is understandable so they can make the voluntary decision to participate or not within the project. However, this project would be mandatory for all staff members. There will be no vulnerable

population within the project group that includes pregnant women, children, or prisoners. The Belmont Report will be the guide for ethical principles, which includes: respect for persons, beneficence, and justice (Kirsh, 2019). With that said, participants will be treated as autonomous agents, those with diminished autonomy are entitled to protection, human subjects will not be harmed, the research will maximize benefits and minimize harm, and benefits and risks of the project will be fairly distributed (Mandal, Acharya, & Parija, 2011). For the Institutional Review Board (IRB) approval, the IRB determination forms per the TUN policy will be submitted and it is expected that the project will likely fall under the category of TUN quality improvement project, which would not require IRB review. In addition, the project site will not require IRB review. Benefits to participation are increased knowledge and awareness of DFU screening and education. Compensation for those participants will include regular pay for attending as well as incentives (gift cards) after week 6 evaluation. Incentives will be given to all participants based on evaluation and if they achieved the goal of improved screening rates.

Plan for Analysis

During the evaluation period, statistical analysis will be performed using the paired McNemar's test using SPSS software. This test is chosen because it is used when there are matched or repeated measures designs which have two variables that assess the same information (Pallant, 2011). This test will allow us to determine the measures pre and post implementation of the DFUSEP training. This test is chosen because it is used to collect data from the group on two different occasions, pre-implementation and post-implementation. In this case, it will measure the success of implementation of the DFUSEP and the participants' knowledge. Twenty charts will be randomly selected based on ICD coding prior to implementation. Variables in selection process include the presence of a DFU, documentation of DFU patient education, and

documentation of a screening exam for DFU. Post implementation an additional random 20 charts are selected to examine the same variables as stated above. These will then be compared using the McNemar's test. Currently there is not a tracking system in place to determine DFU rates at the clinic; therefore the project will be starting from a zero standpoint, and the goal is to improve screening rates for DFUs in all diabetic patients to 100%.

Significance for Nursing

This project is highly significant for nursing as it affects both the nurse and patient. The nurse uses their judgment and skills to care for their patients, and through this implementation project nurses involved will continue to increase their knowledge in DFU screening and education. DFU assessment, screening, and prevention is the main theme of this project, which NPs and nurses are responsible in performing. Among the many reasons why patients are not managed as well as others is the lack of emphasis placed on DFUs in basic training and continuing education of doctors and nurses (Jeffcoate et al., 2018). The nurses will obtain a detailed history of foot ulceration and examination, and education. Nurses are responsible for the education given to patients especially for home care and prevention of DFUs. They educate on the signs and symptoms of worsening symptoms or infection, and they teach medication management. The project results are significant to nursing because they will determine if implementation of the guideline is successful, thus, identifying proper knowledge gained from the education given. Semachew (2018) reports that effective implementation is critical for improved quality of nursing care. A guideline or protocol is needed for NP's and nurses alike to ensure patients are properly taken care of. Current practice focuses on the healing process and how to meet guidelines within the DFU standards of treatment. In comparison, this project will fill in the gaps in practice including providing recommendations and standard of care for

screening DFUs.

Analysis of Results

Statistical analysis was performed, which included using the McNemar's test. Firstly, to gather data prior to using the SPSS software a chart audit tool was used to obtain necessary information Auditing information included the presence of a DFU, documentation of DFU patient education, and documentation of screening exam for DFU. In order to determine this, the eClinicalWorks software was used to obtain charts using specific ICD-10 codes. This helped eliminate other patient charts that were not included in this project. A breakdown of the charts allowed for viewing of charts between October 30 and December 3, 2019 that included patients who were seen for a diabetic issue. In this 5 week time span a total of 108 diabetic patients were seen amongst the providers at the project site. However, for auditing purposes and time constraints a total of 20 random charts were reviewed based on ICD-10 codes. Assumptions included dichotomous variables and one categorical independent variable with two related groups, pre and post implementation.

After data collection was completed, information was inputted into the SPSS software. First, data was entered and variables were defined in SPSS. This included pre and post implementation dichotomous variables. After carefully inputting the data, the McNemar's test was run, which concluded that the DFUSEP was in fact successful. The first test run was the presence of a DFU pre and post implementation. Table 1 shows higher presence of DFUs as opposed to post protocol.

Please see Appendix F for charts and tables, which signify the decrease in DFUs found during examination. There was a 10% decrease post implementation of DFU presence upon examination.

Appendix G shows charts and tables, which report that 20% of the patients were given DFU education pre-implementation. However, post-implementation 80% of patients were given DFU education. This was a significant change after the implementation of the DFUSEP.

The graph shown in Appendix G signifies a vast improvement of DFU education given to patients post-implementation of protocol. An increase from 3 educated patients to 16 patients post-implementation of DFU protocol. This is also an increase from 20% to 80%. (Table 5, 6)

In addition, DFU screening pre and post implementation had also improved (Appendix H, Table 7). DFU screening rates improved from 10% to 70% after implementation of the project.

The charts and tables in Appendix H represent DFU screening pre and post implementation. There is a significant rise in DFU screening performed after the implementation of protocol. An increase from 10% to 70% was identified for DFU screening post implementation.

Significance level is $p < .001$ for DFU screening and education given regarding DFUs. Due to this, it is considered statistically significant as there is strong evidence against the null hypotheses. Thus, the null hypotheses is rejected as there was a significant difference from pre and post protocol implementation. The level of statistical significance is often expressed as a p-value and the smaller the p-value, the stronger the evidence that you should reject the null hypothesis (Mcleod, 2019).

Discussion and Significance

The implementation of the DFUSEP was successful after carefully reviewing statistical information. DFU presence, DFU education, and DFU screening were included in the variables analyzed. In regards to the presence of a DFU, there was a 10% decrease post implementation. Although charts were randomly selected based on specific ICD-10 coding, the overall presence

of a DFU was slightly less post-implementation. The significance level of this was not statistically significant as p-value is > 0.05 (p=.625).

On the other hand, p-value for DFU screening is <.001 (p=.000488 and DFU education is also <.001 (p=.000244). This is proven to be statistically significant for both DFU screening and DFU education provided. DFU education increased from 20% to 80% post-implementation. Based on the charts reviewed, this was a difference from 3 to 16 patients. Additionally, DFU screening was an important factor in determining successful implementation. The screening rates of DFUs pre-implementation were at a low 10%, which equates to 2 patients for every 20. However, post-implementation rates increased to 70%. This totaled 14 patients out of 20 that were screened. Again, these results were statistically significant due to its dramatic improvement.

This brings us back to the project question: Will the implementation of DFUSEP reduce foot ulcer incidence rates in a primary care setting within a 5 week time frame? The implementation of the DFUSEP was shown to reduce foot ulcer incidence rates in the primary care setting in the time allotted; however, there have been limitations to the data collection, which will be discussed later. This project included the implementation of an evidence-based protocol to help staff members and leadership gain the knowledge to meet the needs of diabetic patients in regards to DFU screening and education. In addition, the multidisciplinary team was properly educated and trained on the DFUSEP protocol. Due to this, significant improvement was shown in DFU education to patients and screening with a potential reduction in DFU presence.

Significance

Implementation of protocols have also been proven in the past to improve DFU screening

and education. Developing an evidence-based DFUSEP was at the top of the objective list. This development is significant for both staff members and patients because it can benefit both populations. In addition, the development of the protocol improved education towards patients and DFU screening through evidence-based guidelines. The project was implemented in the time frame of 5 weeks as discussed in the objectives. The final protocol fulfilled objective number three in providing staff education and training prior to implementation. As a result a system for monitoring ongoing DFUs that may assist in all future EMR audits was developed. Guidelines define evidence-based standards of care to provide healthcare professions, policy makers, administrators and people living with diabetes a set of recommendations to prevent, diagnose, and manage diabetes and its complications (Formosa, Gatt, & Chockalingam, 2016). In addition, reliable screening tools and management standards have reduced the rate of amputations by up to 50%. In comparison this project shows a statistically significant improvement in DFU screening and education with the implementation of a DFUSEP.

Limitations

This project had several limitations. Although the data did suggest the protocol to be successful, there have been limitations to data collection. First, there was no protocol in place prior to project implementation to tell providers where to document DFUs. Therefore, it was difficult to ascertain the success rate pre and post protocol implementation in regards to DFU documentation.

Data collection and analysis for this project also had limitations. Although a chart audit tool was utilized, there was a larger amount of coding that could have been applied in order to determine DFU presence, education, and screening. A select few of charts were audited based on the ICD-10 codes on the chart audit tool, which hindered the overall project in identifying the

actual amount of patients affected by DFUs. In addition, because of the limited amount of patient charts audited, determining the significance of data was difficult. Provider variations in practice regarding screening and documentation of DFUs may have affected pre-implementation rates; thus, if staff members were not screening at all, it would be difficult to obtain sufficient data and would skew the results. There was also a physical limitation.

Lastly, the time frame of this project was only five weeks. Due to the shortened time frame the data obtained may not have accurately determined the success rate of the protocol. Monitoring for a longer course over months to a year will help provide a more accurate rate of DFU presence, staff education for DFUs and screening. This will result in the lack of long term impact analysis. Further questions regarding the protocol's impact may not be answered within the time frame allotted.

Dissemination

This projects results will be submitted to The Journal for Healthcare Quality (JHQ) for consideration of publication. The JHQ is an official publication of the National Association for Healthcare Quality and promotes the art and science of healthcare quality practice to improve health outcomes and advance the practice in changing environments (National Association for Healthcare Quality, 2020). Submission of the manuscript will help current and future healthcare professionals improve health related outcomes. I will also submit the require repository to the DNP Project Repository at doctorsofnursingpractice.org. By submitting to the repository this will allow this project to be shared into the scholarly community and the consumer community, which will further disseminate DNP generated content for all those interested as well as support the growth and development of DNP students (Doctors of Nursing Practice, 2020).

Upon obtaining the project results, I was able to review them with all staff personnel.

Project dissemination took place during a monthly staff meeting at the project site. Results were inputted into a presentation in which I shared the end results with staff including the leadership, providers, and nurses. Attention was made to the increase in patient satisfaction, DFU screening and prevention. Staff members were also pleased with the results as they have worked hard in following the protocol. Further dissemination will be conducted with the DNP project team.

Sustainability

Sustainability of the project within the project site is of importance. For successful adoption of the protocol by the site, further education was given to staff members. A group of nurses and medical assistants were educated on how to properly audit charts using the chart audit tool. Auditing charts on a quarterly basis will increase the amount of data collected. This will provide valuable feedback that will help in training all health care staff.

Sustainability groups are currently being formed that consist of stakeholders. They will work together in decision making to improve the protocol over time. A DFUSEP chair has been appointed to take over and continue my work. This clinician will be held responsible in continuation and sustaining the protocol; thus, expanding of the project over a longer period of time.

Consistent and quarterly training will be given to the providers as they are the main staff members who will screen and educate on DFUs. In addition, in-service training will be performed on a quarterly basis to help new staff members become familiar with the protocol and help them implement it into their practice. The IT team will also play in role in sustainability and will start to develop an effective communication system through EHRs, which will aid in the timely communication of results during chart audits.

Future providers and DNPs at other clinical sites will be able to adopt this project and

make changes if necessary dependent on their clinical recommendations or changes in clinical site. If adoption is performed at other clinical sites there would be a greater insight on DFU presence, screening and education. However, a new team at each clinical site would be appointed for implementation. With their continued help and support, this program will sustain for many more years to come.

Conclusion

DFUs affect both type I and type II diabetes and the complications associated with this may be detrimental to one's health. The overall purpose of this project was to determine if the implementation of a DFUSEP would reduce DFU incidence in the primary care setting. Prior to protocol implementation there was no tracking system in place to determine DFU rates at the clinic. This project enabled the development of a tracking system to improve screening rates for DFUs.

Due to the lack of emphasis placed on DFUs in basic training there was limited information at the clinical site regarding the significance of DFUs. Post implementation would include improved DFU screening, education, and decreased presence. The staff members who participated demonstrated an increase in knowledge on evidence-based approaches to DFU screening and education. The findings of this project shows an overall satisfaction from staff members and patients. There was also a significant improvement in documentation of DFUs in patient charts as well as the documentation of proper foot screening. Due to an overall improvement of DFU incidence this protocol may serve as a guide for future healthcare professionals to adopt into their practice. Without the implementation of this project DFUs at the project site may have gone unnoticed. Although this program may have seemed successful and had improved outcomes, there is still further research that requires exploring to further improve

patient outcomes. However, it is our due diligence to continue to provide the necessary education and screening on DFUs so patient health is not negatively impacted.

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Appendix A

Written statement to conduct the project at the site.

Preferred Family Care
5925 Truxtun Extension – Suite A
Bakersfield, CA 93309-0433
Phone: 661-638-2273 - Fax: 661-638-2288

September 26, 2019

To whom it may concern,

Jesus Macanas Jr., who is a current student at Touro University, has come forward with his project proposal to implement a Diabetic Foot Ulcer Screening and Education Protocol. After review, it is our pleasure to have him perform the project at our site.

If you have any questions or concerns, please feel free to contact our facility at any time.

Sincerely,

Teri Reyes
Operations Manager

Appendix B

Tools/Instrumentation: Flyer/Email Template

TAKE CONTROL ON DIABETES SCREENING

DIABETES

A DIABETIC FOOT ULCER SCREENING AND EDUCATION PROTOCOL

DATE: OCTOBER 7 THROUGH 11

TIME: 0800 AND 1500

LOCATION:

PREFERRED FAMILY CARE EDUCATION ROOM

PREFERRED FAMILY CARE

This in depth educational seminar will cover a diabetic foot ulcer screening and education protocol that will be implemented into our practice.

This will allow all staff members to be up-to-date on current screening, management, and education on diabetes to help reduce the risks of foot ulcers.

This seminar is mandatory for all leadership, providers, nurses, and MA's. Drinks and snacks will be provided. **Quarterly bonuses will be given dependent on post audit of protocol implementation.**

Come one, come all! Please join us for this educational experience!

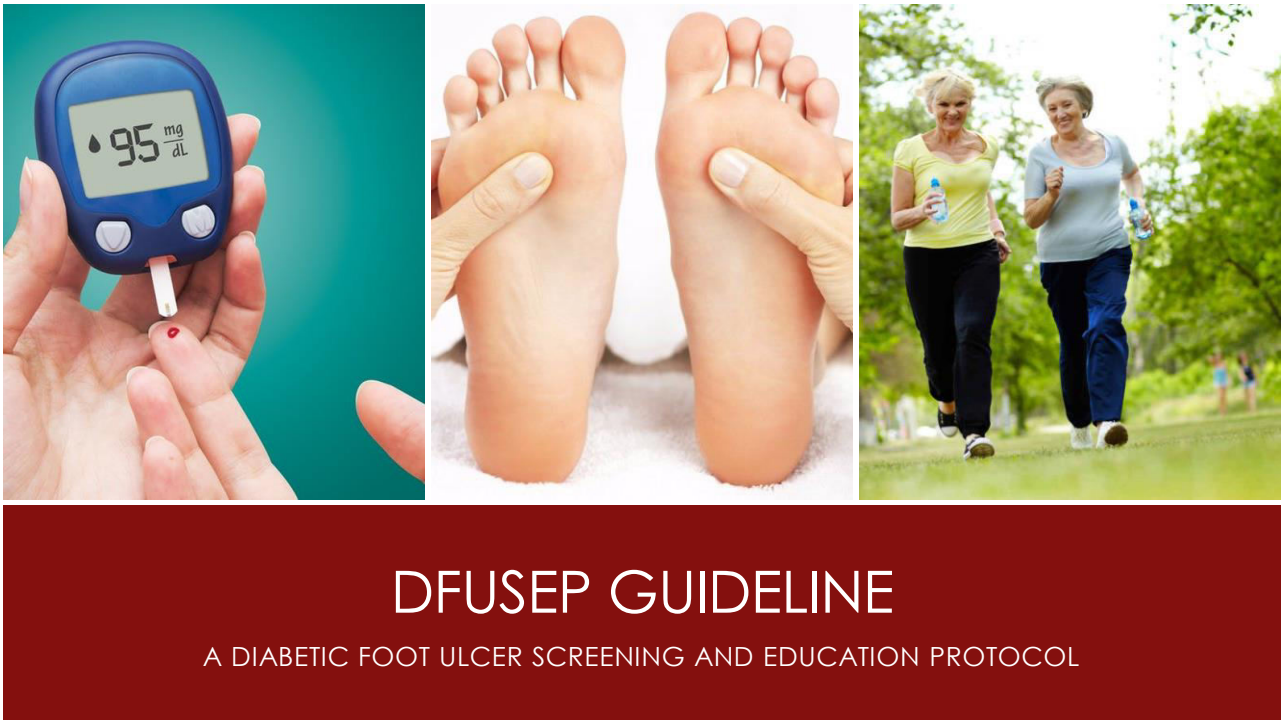
To sign up for either morning or afternoon classes, please contact Teri Reyes at 661-638-2273

You can also email at treyes@heart24.com

5925-A Truxtun Avenue Bakersfield, CA 93309 Education Room

Appendix C

Tools/Instrumentation: PowerPoint



(Double-click for presentation)

Appendix D

Diabetic Foot Ulcer Screening and Education Protocol

Purpose: Guide leadership, medical providers and staff members alike in reducing DFU incidence

Objectives:

-Provide a resource to address gaps in DFU screening.
-Encourage continuous DFU screening and education.
-Provide multidisciplinary staff guidance for the DFUSEP.
-Develop a system for monitoring ongoing DFUs through EMR audits.

Indications: Diabetic patients with and without DFUs

Contraindications: Non-compliant patients and those under the age of 18.

Steps:

1. Medical professional will initiate DFUSEP upon visit of diabetic patient.
2. **Assessment:**
    a. Provider Assessment:
        i. Evaluate for the presence of a DFU
            1. Assess for neuropathy
        ii. Assess current medications used for diabetes
        iii. Assess home blood sugar logs
    b. Nurse Assessment:
        i. Obtain detailed history of foot ulceration
        ii. Assess current knowledge on DFUs
3. **Plan:** Provider and nurse will educate patients on DFU prevention and screening
4. **Interventions:**
    a. Monitor blood sugar levels on a regularly
        i. Especially if blood sugar levels uncontrolled
        ii. Glycemic control has an effect on wound healing and prevention
    b. Have routine blood work performed to monitor A1C
    c. Always wear protective footwear even if only at home
        i. Especially important for patients with neuropathy
        ii. Avoid walking barefoot
    d. Practice proper foot hygiene
        i. Diabetics at risk for foot infections
        ii. Nail and skin care, inter-digital spaces
        iii. Wear clean socks daily and avoid tight fitted socks
    e. Educate on the importance of smoking cessation if indicated
    f. Advise on the importance of lifestyle modification
    g. Monitor blood pressure with hypertensive patients
        i. Cardiovascular complications may complicate DFUs
    h. Off-loading education
        i. Hallmark DFU prevention since the 19th century.
    i. Monitor for wound infection
    j. Monitor for pre-ulcerative signs
        i. Formation of callus, blisters or hemorrhage
    k. Use of infrared thermometer to monitor skin temperatures
        i. Effective in high risk patients

    l. Obtain custom fitted diabetic shoes

5. **Medications:**
    a. Medications will be changed in the event that the patient has poor glycemic control
6. **Referrals:**
    a. Patients will be referred out in the event that the diabetic foot ulcer is not well-managed and requires thorough debridement and further wound dressing management

Appendix E

Chart Audit Tool- DFUSEP

Reviewer: PFC Staff **Date:** December 3, 2019

Charts Total (n=40)
Values (1=No, 2=Yes)

Pre-implementation

id	Presence of DFU	Documentation of DFU patient education	Documentation of screening exam for DFU
1	1	1	1
2	1	1	1
3	1	1	1
4	2	2	1
5	1	1	1
6	1	1	1
7	1	2	2
8	1	1	1
9	2	1	1
10	1	1	1
11	1	1	1
12	1	1	1
13	2	2	2
14	2	1	1
15	1	1	1
16	1	1	1
17	1	1	1
18	1	1	1
19	1	1	1
20	1	1	1

Post-Implementation

id	Presence of DFU	Documentation of DFU patient education	Documentation of screening exam for DFU
1	1	2	2
2	1	2	2
3	1	2	2
4	1	2	2

5	1	2	1
6	1	1	1
7	2	2	2
8	1	2	2
9	1	1	1
10	1	1	1
11	1	2	2
12	1	2	2
13	1	2	2
14	2	1	1
15	1	2	2
16	1	2	2
17	1	2	2
18	1	2	2
19	1	2	2
20	1	2	1

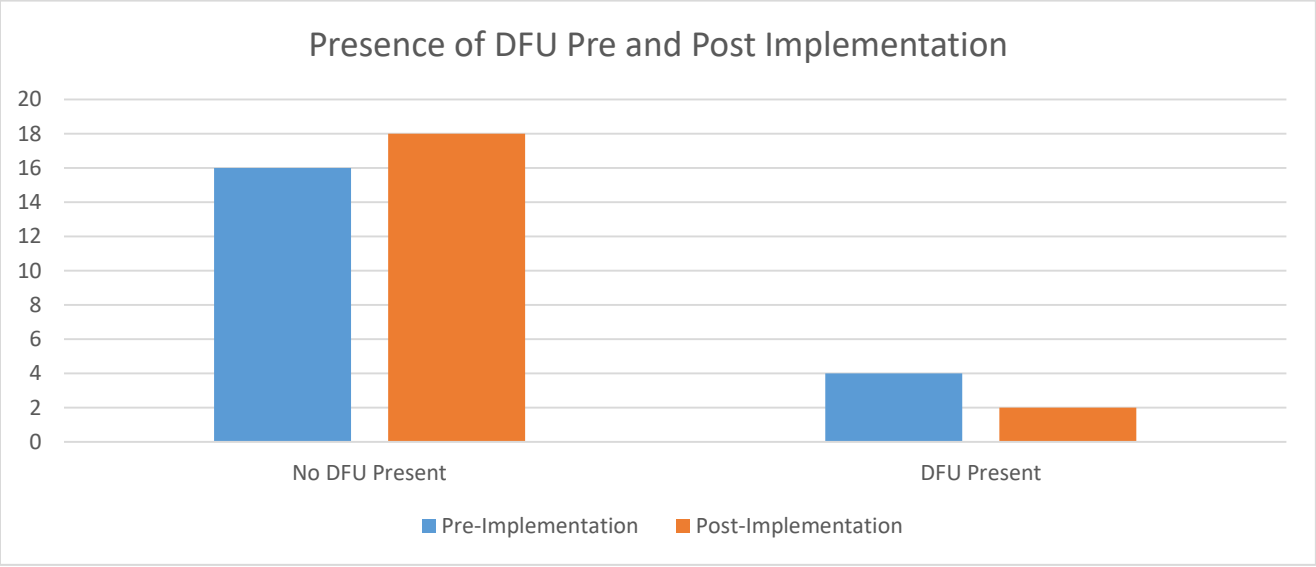
Appendix F

McNemar's Test

Presence of DFU Pre * Presence of DFU Post Crosstabulation

			Presence of DFU Post		
			No DFU present	DFU present	Total
Presence of DFU Pre	No DFU present	Count	15	1	16
		% within Presence of DFU Pre	93.8%	6.3%	100.0%
		% within Presence of DFU Post	83.3%	50.0%	80.0%
	DFU present	Count	3	1	4
		% within Presence of DFU Pre	75.0%	25.0%	100.0%
		% within Presence of DFU Post	16.7%	50.0%	20.0%
Total		Count	18	2	20
		% within Presence of DFU Pre	90.0%	10.0%	100.0%
		% within Presence of DFU Post	100.0%	100.0%	100.0%

(Table 1)



(Chart 1)

Appendix F Continued

Statistical Significance

Presence of DFU Pre-Implementation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No DFU present	16	80.0	80.0	80.0
	DFU present	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

(Table 2)

Presence of DFU Post-Implementation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No DFU present	18	90.0	90.0	90.0
	DFU present	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

(Table 3)

Appendix G

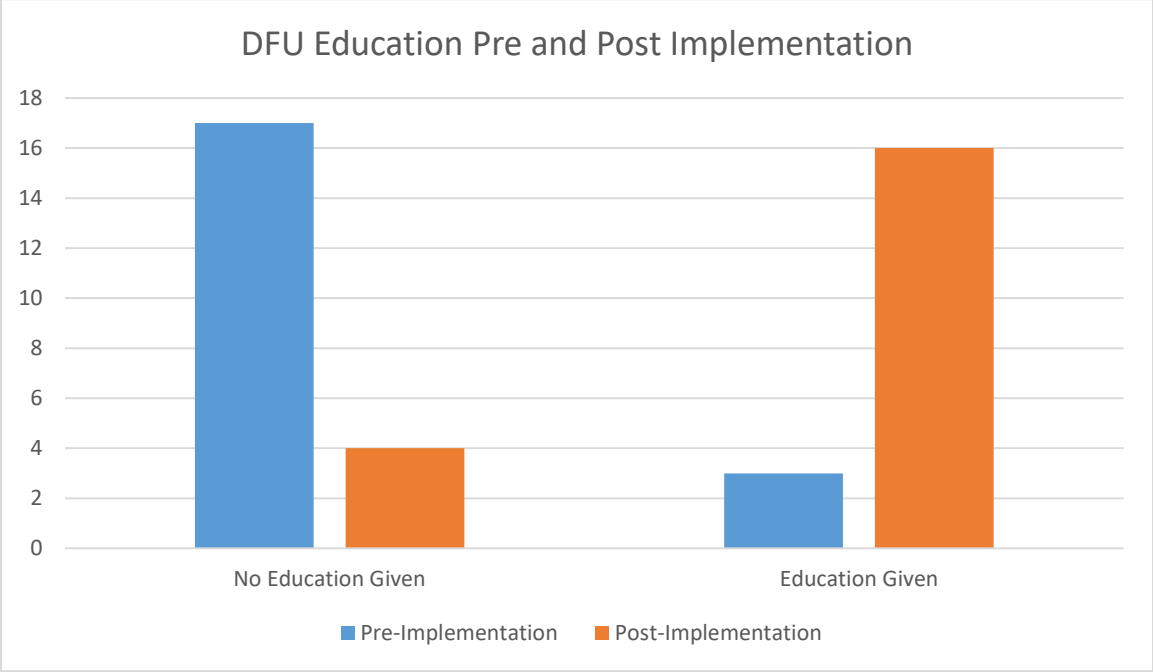
McNemar's Test

DFU Education Pre * DFU Education Post Crosstabulation

			DFU Education Post		
			No education given	Education given	Total
DFU Education Pre	No education given	Count	4	13	17
		% within DFU Education Pre	23.5%	76.5%	100.0%
		% within DFU Education Post	100.0%	81.3%	85.0%
	Education given	Count	0	3	3
		% within DFU Education Pre	0.0%	100.0%	100.0%
		% within DFU Education Post	0.0%	18.8%	15.0%
Total		Count	4	16	20
		% within DFU Education Pre	20.0%	80.0%	100.0%
		% within DFU Education Post	100.0%	100.0%	100.0%

(Table 4)

Appendix G Continued



(Chart 2)

Statistical Significance

DFU Education Pre

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No education given	17	85.0	85.0	85.0
	Education given	3	15.0	15.0	100.0

	Total	20	100.0	100.0	

(table 5)

DFU Education Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No education given	4	20.0	20.0	20.0
	Education given	16	80.0	80.0	100.0
	Total	20	100.0	100.0	

(Table 6)

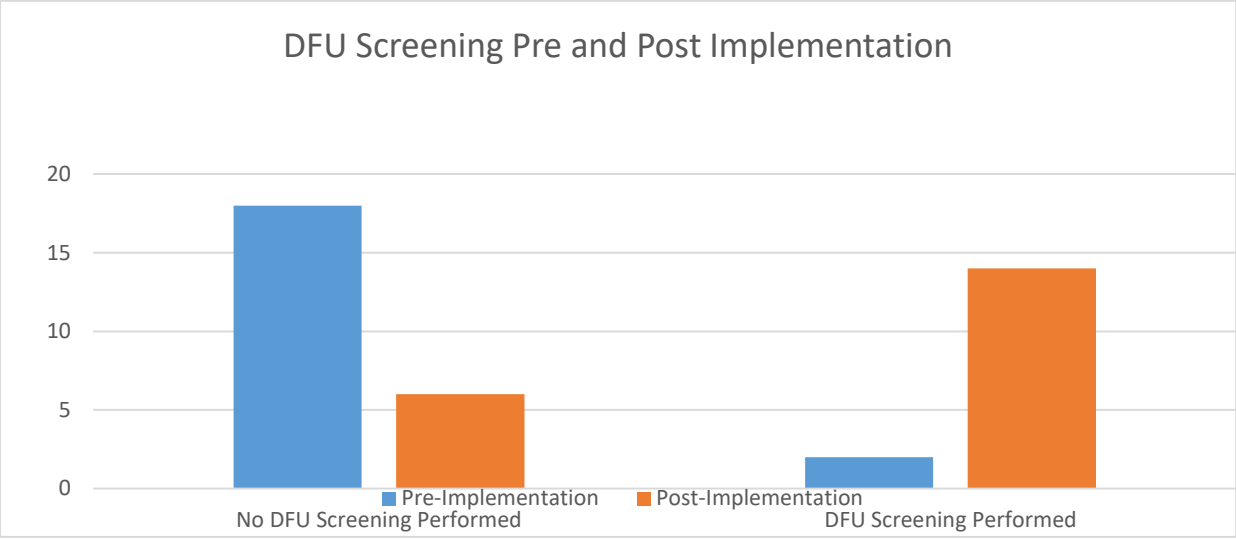
Appendix H

McNemar's Test

DFU Screening Pre * DFU Screening Post Crosstabulation

			DFU Screening Post		
			No screening performed	DFU screening performed	Total
DFU Screening Pre	No screening performed	Count	6	12	18
		% within DFU Screening Pre	33.3%	66.7%	100.0%
		% within DFU Screening Post	100.0%	85.7%	90.0%
	DFU screening performed	Count	0	2	2
		% within DFU Screening Pre	0.0%	100.0%	100.0%
		% within DFU Screening Post	0.0%	14.3%	10.0%
Total		Count	6	14	20
		% within DFU Screening Pre	30.0%	70.0%	100.0%
		% within DFU Screening Post	100.0%	100.0%	100.0%

(Table 7)



(Chart 3)

Appendix H Continued

Statistical Significance

DFU Screening Pre

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No screening performed	18	90.0	90.0	90.0
	DFU screening performed	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

(Table 8)

DFU Screening Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No screening performed	6	30.0	30.0	30.0
	DFU screening performed	14	70.0	70.0	100.0
	Total	20	100.0	100.0	

(Table 9)