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The Collaborative Health Objectives in Combatting the Effects of Diabetic Peripheral Neuropathy (Choice): a Second Chance to Change Diabetic Destiny

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ABSTRACT

THE COLLABORATIVE HEALTH OBJECTIVES IN COMBATTING THE EFFECTS OF DIABETIC PERIPHERAL NEUROPATHY (CHOICE); A SECOND CHANCE TO CHANGE DIABETIC DESTINY

The Collaborative Health Objective in Combatting the Effects of Diabetic Peripheral Neuropathy (CHOICE); A Second Chance to Change Diabetic Destiny, is a research pilot study that will test the validity of *The Diabetic Foot Book*. Diabetic peripheral neuropathy (DPN) affects 60-70% of the diabetic population. The CHOICE project will use *The Diabetic Foot Book*, a patient education booklet, created explicitly for the DPN population. The goal of the pilot study is to evaluate the effectiveness of The Diabetic Foot Book to increase health literacy and affect behavior change in the DPN population.

by
Alishia A. Claibourn

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APPROVED

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CHAPTER 1: INTRODUCTION

Globally, 380 million people, or 8.3% of the population have diabetes (Hu, 2015). Thirty million people are living with diabetes in the United States of America. According to the Center for Disease Control (CDC), the rate of diabetes increases by 5% every year in the USA. It is estimated that 83.1 million people are pre-diabetic and will become diabetic within five years, if measures are not taken to prevent the onset of diabetes (Center for Disease Control, 2017).

Many of the complications in the diabetic disease process are avoidable (Caraces, 2017, Tuso, 2014, and Nickerson, 2012). Implementing proper management of diabetes will allow patients to reduce the risk of diabetic complications (National Center for Chronic Disease Prevention and Health Promotion, 2017). Diabetic peripheral neuropathy (DPN) is a complication of diabetes that affects 60-70% of the diabetic population (National Institute of Neurological Disorders and Strokes, 2019). The presence of hyperglycemia in diabetics is responsible for neuropathic symptoms and syndromes (National Institute of Neurological Disorders and Strokes, 2019). DPN has a significant effect on the patient's quality of life. An increased need for health care often results in an increased financial burden for the patient and the health care system. DPN can lead to diabetic foot ulcers and amputations in the uncontrolled diabetic. The lack of adherence to the diabetic regimen is a complex issue with multiple barriers related to the comprehension and application of the diabetic regimen, including psychological unrest, social influences, financial burden, decreased literacy, and numeracy deficits (Gerber et al 2010).

Fifty percent of the DPN population will have diabetic foot ulcers (Armstrong, 2017). Worldwide, Diabetic foot ulcers affect 9.1 to 26.1 million people annually. In the United States, 1 to 3 million people have an active diabetic foot ulcer or history of foot

ulcer. Annually, 176 billion dollars are spent in the United States on the treatment of diabetic foot ulcers (Armstrong, 2017). Though it is possible to heal a diabetic foot ulcer, it is estimated that 40% of people will re-ulcerate within 1 year, 60% of people will re-ulcerate in 3 years, and 65% will re-ulcerate in 5 years (Armstrong, 2017).

The Collaborative Health Objective in Combatting the Effects of Diabetic Peripheral Neuropathy (CHOICE); a second chance to change your diabetic destiny, is a research pilot study that tested the effectiveness of *The Diabetic Foot Book*. *The Diabetic Foot Book* is an educational tool, created in novella format, to address diabetes and DPN. DPN complications can lead to pre-ulcerative callus, foot deformity, foot ulcers, and amputations. The CHOICE project tested the effectiveness of *The Diabetic Foot Book*, a patient education booklet, created explicitly for the DPN population. A pre-test was given to establish a DPN knowledge baseline, followed by instruction from *The Diabetic Foot Book*, a post test was given to validate the presence of increased DPN knowledge.

The diabetic complication of DPN is preventable (Caraces, 2017, Tusso, 2014, and Nickerson, 2012) *The Diabetic Foot Book* is educational tool, presented in the format of a story, depicting the journey of Diabetty, who has recently been diagnosed with DPN. Participants of the pilot study were instructed in groups of three or fewer people. The silent symptoms of diabetes lead to devastating, life-changing complications that eventually affect quality of life and become a financial burden on patients and society (Gallman, 2017). Moreover, the complications of diabetes are far-reaching and affect multiple body systems, which can lead to death (Center for Disease Control and Prevention, 2017). The long term goals of *The Diabetic Foot book* are to help decrease the life-changing complications through education and support.

Healthy People 2020 Diabetic Objectives

The goal of Healthy People and Healthy People 2020 is to implement objectives that will allow people to live longer, free of preventable diseases, disability, injury, and premature death. The Healthy People promotion also strives to create equality in healthcare by creating a physical and social environment that supports all people in living a healthy life. Healthy People identify and prioritize national health problems (Healthypeople.gov, 2019). Public health awareness regarding disease proliferation and the measures taken to eradicate those disease processes, are implemented. The Healthy People Program identifies and provides measurable objectives and goals that are addressed at local, state, and national levels. Research is critical in providing new evidenced-based practice measures (Healthypeople.gov, 2019).

Healthy People 2020 identified 1,300 objectives related to 42 topics. One of the topics identified is diabetes (Healthypeople.gov, 2019). Two objectives related to the CHOICE pilot study are: i) improving diabetic self-management, by implementing outpatient diabetic education and ii) reducing the rate of lower extremity amputations in people who have diabetes (Healthypeople.gov, 2019).

Diabetic Lower Extremity Amputations

There is currently no target decrease number noted in the Healthy People 2020 program. Between 2009 and 2015, there was a 4.6 % decrease in lower extremity amputations per 1,000 people in the diabetic population (Caffey, 2018). Lower extremity amputations are being tracked for increases in incidence. If an increase is noted, a decision will be made by Healthy people 2020 to provide objectives in an attempt to decrease the prevalence of diabetic lower extremity amputations. Attacking diabetes and diabetic complications from multiple standpoints may reduce the need for targeting lower extremity amputations, particularly, as they are preventable (Healthypeople.gov, 2019).

Diabetic Self-Management Training

Diabetes affects 9.4% of the population in the United States of America (Center for Disease Control and Prevention, 2017). Only 62.5% of the diabetic population received normal training in diabetic self-management (Center for Disease Control, 2017). Every person deserves the opportunity to make informed decisions related to medical care. Formal diabetic self-management training will give everyone in the diabetic population the opportunity to make an informed decision regarding their diabetic care (Center for Disease Control, 2017).

Theory

The integrated theory of behavior health change (ITBHC) provides a foundational philosophical view for delivering healthcare and education to impact beliefs, which can encourage people to make better healthcare choices (Ryan, 2009). The theory is patient-centered, which encourages implementing practice, while addressing socio-economic factors, physical state, as well as mental and emotional readiness to learn, and begin the behavior change process (Ryan, 2009).

The ITBHC was created by Ryan (2009) to integrate the theory of behavior change into practice. Research studies have been conducted on behavior change, but they were not comprehensive. A literature review of peer-reviewed published research over ten years was completed. The review revealed several different theories and interventions that lead to behavior change (Ryan, 2009). Nonetheless, interventions and theories were specific to one disease process or behavior. The ITBHC was created to provide a comprehensive framework, applicable to all behavior change challenges (Ryan, 2009).

Theoretical Assumptions

The ITBHC assumes that behavior change is a dynamic process. Healthy behavior change requires the desire and motivation to change unhealthy behaviors (Ryan, 2009). The ITBHC also assumes that social facilitation will validate positive feedback, as a key in sustaining healthy behavior changes (Ryan, 2009). On the basis, instruction and care are patient-centered and individualized to ensure the greatest potential for achieving behavior change.

Concepts

The concepts included in the ITBHC encourage and foster increased knowledge and beliefs conducive to health behavior change, social facilitation, and teaching skills. These concepts impact self-efficacy and health literacy, encouraging effective management of comprehensive health requirements to achieve optimal health status (Ryan, 2009). The ITBHC integrates several different theories to address behavior change. The social support theory, health behavior change theory, and self-regulation theory are integrated into the ITBHC. The integration of several theories allows mind, body, and spirit to work together to achieve mutually planned goals (Ryan, 2009).

Knowledge and Belief

Knowledge and beliefs are constructs included in the ITBHC (Ryan, 2009). Though knowledge and beliefs do not change behavior, they are integral to improved health status. Knowledge is defined as understanding the disease-specific information, related to a progressive process. Beliefs are defined as the person's perception of the condition requiring management (Ryan, 2009). Arming patients with knowledge can impact their beliefs, allow informed decisions to be made, allows for the first steps in the behavior change process to begin (Ryan, 2009).

The CHOICE project allowed the participants to express their beliefs related to DPN by talking about their diabetic experiences. *The Diabetic Foot Book* depicts the experiences of Diabetty, a character that has a new diagnosis of DPN. The participants were able to relate their experiences to Diabetty's experience. The constructivist learning theory states the adult learner is successful in grasping content if they can connect new knowledge to previous knowledge allowing new information to be understood, retained and utilized (Palis, and Quiros, 2014).

Self-regulation

Self-regulation is defined as integrating behavior changes into lifestyles and daily routines (Ryan, 2009). *The Diabetic Foot Book* encourages self-monitoring and provides activities that encourage patients to participate in goal setting. A meal and blood glucose log are provided that can be duplicated, allowing the participant to document what they are consuming and compare the results of blood glucose with the food that is consumed to help guide the choices that are made with food selections. Self-monitoring of blood glucose and diet assists the patient in managing diabetes (Kirk 2010, Ong et al. 2014, and Zhu-De Hul, 2017).

Social facilitation

Social facilitation is defined as the support of behavior changes provided by family, friends, and media (Ryan, 2009). Any external positive influence to change and maintain behavior falls under the category of social facilitation (Ryan, 2009). Behavior change is difficult and will require the integration of all concepts into individual lifestyles to have the best chance of maintaining healthy behavior. *The Diabetic Foot Book* is a guide that can be shared with family members and friends, allowing them to understand

new requirements and the consequences of non-adherence. Family understanding of treatment requirements arms the family with information needed to support the patient in behavior change (Baig et al., 2015, Bennich et al. 2017, Rian Adi Pamungkas 2017)

Application to Behavior Change Research

The ITBHC theory was applied to a study of women with osteoporosis (Ryan, 2009). The goal of the study was to affect behavior change in the participants by increasing their knowledge base, in regards to osteoporosis and self-regulation skills (Ryan, 2009). Participant's beliefs regarding osteoporosis changed as a result of instruction and coaching. In this study, participants were given surveys and coaching via a computer-based application. Participants were able to learn, create their goals, and plan the implementation of intervention into their daily routines and lifestyles to manage osteoporosis (Ryan, 2009). *The Diabetic Foot Book* placed activities such as blood glucose logs, food diary, and goal setting charts. The incorporation of these activities in *The Diabetic Foot Book* encourages the participant to take an active role planning diabetic care.

Diabetes is a complex disease process, which is challenging to manage. The patient with diabetes is diagnosed, usually while in a 15 or 20-minute doctor's appointment (Gellman, 2017). Patients diagnosed with diabetes are generally provided a treatment plan, with the expectation that it will be implemented. The treatment plan is usually accompanied with follow-up through a group class or a phone call from a chronic conditions case manager. Patients are also given information in a fragmented format and expected to perform prescribed treatment, sometimes without fully understanding what is happening to their bodies, or what impact this new disease process will have on their quality of life (Gallman, 2017). It is unlikely that the patient will be motivated to change their behavior without having the information to make an informed decision about their

care. Applying the ITBHC, as a philosophical foundation, will allow providers to make changes to diabetic care and instruction, empowering the patient to make healthy behavior changes (Ryan, 2009).

The ITBHC benefits the patient by providing a comprehensive and integrated approach to instruction. Application of this approach provides an opportunity to close the knowledge gap, raise self-efficacy, and may have an impact on healthy behaviors in the long-term (Ryan, 2009). One of the benefits of using the ITBHC framework is it permits patient intervention, geared to the patient's knowledge and literacy. An additional benefit of the ITBHC is it encourages a collaborative relationship between patient and provider, fostering effective management of the disease process (Ryan, 2009). The patient's understanding of the disease process affords them an opportunity to make informed decisions about individual care, realizing the patient's right to make a decision that fits their needs (Jonsen, 2002).

The medical community must remember that the patient's decision is the decision that matters (Jonsen, 2002). Every patient differs with respect to their comprehension of the information provided. A collaborative effort between patient and care provider will benefit both sides (Jonsen, 2002). Informed decisions are cost effective and efficient, reducing the expense associated with convincing patients to adopt recommendations that they otherwise may not understand.

Concepts from the ITBHC were employed while creating *The Diabetic Foot Book* CHOICE pilot study. These included questionnaire assessments to establish baseline DPN knowledge and presentations in small groups. The efficacy of *The Diabetic Foot Book* will be measured by a post-assessment test to determine if an increase in DPN knowledge was achieved. *The Diabetic Foot Book* will attempt to increase the patient's knowledge and impact the patient's health care beliefs, self-regulation skills, and ability to proximally promote self-efficacy and management of the DPN disease process. These

characteristics are congruent with the concepts of the ITBHC. Further, the ITBHC theory is ideal for the CHOICE project because it provides a framework to create a DPN educational format that takes patient health literacy into consideration and recognizes the efficacy of individual or small group interventions (Ryan, 2009). Knowledge alone is not enough to facilitate behavior change; patients must accept new behaviors as part of their existence (Ryan, 2009). The CHOICE project facilitated a two-way conversation, in which the patient's concerns and challenges are acknowledged. Instruction is given on the consequences of choices, with the promise to support the patient in the decision making process.

In conclusion, while the goal of using the ITBHC theory to encourage change, the CHOICE project must remember that behavior change is a process of six stages. Pre-contemplation is the first stage, which occurs immediately following diagnosis. In the pre-contemplation stage the patient is processing the information provided. The second stage is contemplation, where the patient begins to recognize the unhealthy behavior choices that are contributing to the disease process. The third stage is preparation, where the patient begins to understand and accept the necessity for change and may begin to make preparations to correct unhealthy behavior. The fourth stage is action; wherein actual changes are made to improve behavior. The fifth stage is the maintenance of behavior changes, for at least six months, demonstrating that the patient has learned techniques that prevent unhealthy behaviors. The sixth stage is relapse (Cherry, 2018). The sixth stage was not addressed in the ITBHC. An article documented that almost everyone relapses when a chronic long-term diagnosis exists (Peyrot, 2007).

The CHOICE project will investigate the efficacy of *The Diabetic Foot Book* and attempt to support patients in maintaining healthy behavior, by equipping them with the tools necessary to make choices that encourage healthy behaviors. It is imperative to allow the patient to choose the path they wish to travel. Achieving healthy behavior is a

balanced scale; one adverse life event will unbalance the scales, resulting in poor health and reduced quality of life (New CDC report: More than 100 million Americans have diabetes or pre-diabetes, 2017).

CHAPTER 2: LITERATURE REVIEW

The Evidence

Diabetes is a disease process that is debilitating to the patient, the health system, and the family unit (Baig, et al 2015 and The Lancet Diabetes & Endocrinology, 2018). Treatment required to manage diabetes is available, but many patients do not adhere to the treatment. Non-adherence to the prescribed treatment of diabetes can result in life-changing medical problems (Baig, et al 2015 and The Lancet Diabetes & Endocrinology, 2018). One of the complications of diabetes is DPN, which is a result of sustained high blood glucose coupled with high fat levels (Mayo Clinic, 2018). This literature review will support and address the need for diabetic education that is applicable a diverse population appealing to multiple levels of health literacy. A review of the research identified challenges to improving outcomes for the diabetic patient. The challenges this literature review will address are adherence, health literacy, diabetic education, and educational styles.

Adherence to Diabetic Management

The effects of diabetic non-adherence to treatment recommendations have a negative impact on quality of life, survival, and places an economic burden on the patient and society. A meta-analysis reported 70% of those requiring complex treatment and lifestyle changes are not successful in sustaining health (Martin, 2005). The study also found that effective communication between healthcare providers and patients can improve adherence to treatment (Martin, 2005).

Diabetic management has many barriers to adhering to recommended treatment regimen. In a quest to find different approaches to helping patients successfully adhere to diabetic regimen studies found individualized patient-centered planning, requiring the patient to take an active role in care planning, will increase adherence and improve outcomes (Schechter, 2002). Schechter 2002, found that an individual patient-centered approach can encourage and support increased adherence by allowing implementation of various interventions, inclusive of measures to change behavior, instruction, and providing support to the diabetic patient (Schechter, 2002).

Martin, 2005 and Schechter, 2002 studies identified that diabetes is a complex disease affecting many facets of life, which can require multiple interventions, depending on the individual challenges of the diabetic patient. Patient-centered care, allowing the patient to participate in individualized planning, will improve the probability of adherence to the diabetic regimen, resulting in improved management of diabetes (Martin, 2005).

Funnell (2004) identified a gap between the promise and the reality of diabetic care. In the past, medicine and medical treatment were practiced authoritatively, with a 'Do-As-I-say' mantra. The prevalence of uncontrolled diabetes and diabetic complications adds weight to the claim that such an approach to treating chronic conditions is ineffective. Funnell (2004) identified three principles in the improvement of adherence and diabetic outcomes: choices, control, and consequences, echoing the findings of Schechter (2002) and Martin (2005). These studies advocate including the patient in the decision-making process. Current measures of standardized instruction, without regard for health literacy, socio-economic challenges, or a lack of motivation to perform the prescribed treatment, has not proved to be successful, at least with respect to the diabetic population. The participation of the patient in their care will increase and improve adherence to the collaborative plan (Funnell, 2004).

Health Literacy

Diabetic Self-Management Education (DSME) is essential in the fight against uncontrolled diabetes (Vandenbosch, 2018). DSME success depends on the type of program provided and the patient's level of health literacy. Low health literacy has been associated with poor outcomes, due to poor self-management and poor medication adherence. Vandenbosch (2018), performed a study addressing the impact of health literacy on self-management behavior included 366 diabetic patients from nine countries. The study found that patients in the higher health literacy group scored higher on the functional and critical points of diabetic health literacy. The higher health literacy group also had less distress and were able to understand the severity of diabetes (Vandenbosch, 2018). Patients in the lower health literacy group showed an increase diabetic knowledge when in communicative diabetes. However, patients in the higher health literacy group remained at the same level. The study concludes that both higher literacy and lower literacy groups benefitted from the educational intervention, in terms of improvement in self-care behaviors (Vandenbosch, 2018).

The distance study performed in 2016 by Kaiser Permanente to determine if communication barriers impact DPN treatment (Adams, 2016). Over 12,000 diabetic participants were given a random, race-stratified survey. In the participant population, 8,245 patients did not show any symptoms of DPN and 4,436 patients reported symptoms of DPN. A cross-sectional design was inclusive of the five largest patient populations. The ethnic subgroups were African American, White, Chinese, Filipino, and Latino. All patients were Kaiser Permanente health plan members. The independent variables were patient-provider communication, health literacy, and English as a second language. The dependent variable was communication barriers. The regression model, communication styles recognition, and treatment of DPN are measurements used to identify the validity

of results (Adams, 2016). The study found that new strategies are needed to address communication barriers in the treatment of DPN (Adams, 2016).

A 2015 study used the prescription model to evaluate diabetic educational material targeted in accordance with patient's health literacy levels and learning styles (Koonce, et al. 2015). This model has been shown to be successful, with respect to patient education, when provided to patients with hypertension. This was a randomized study, which included a diabetic knowledge test, learning style assessment, subjective numeracy scale, and a short health literacy test. The inclusion criteria required patients that were 18 years of age or older, English or Spanish speaking, and who have been diagnosed with type 2 diabetes, producing a total of 166 participants. Data from the first test scores was taken and diabetic educational material was created. That material was divided into levels. The first was substantially composed of pictures, the second was composed at 5th-grade reading level, and the third at 8th-grade reading level. Auditory learners were able to listen to the information. The educational material was given to the participants to take home for future reference. Two and six weeks after the intervention, patients were contacted via telephone and repeated the diabetic knowledge test. A Likert-style test was also given to establish the level of satisfaction with the educational materials (Koonce et al., 2015). The researchers found a significant increase in diabetic knowledge among the participant population. Koonce 2015 and Vandenbosch, 2018 identified results that support the argument that providing educational information at the appropriate health literacy level will improve diabetic literacy. In addition, Koonce 2015 recognizes that improving diabetic literacy might increase patients' quality of life; a result of accurate comprehension and application of treatment, and control of the diabetic condition (Koonce et al., 2015).

Health literacy has been shown to have a relationship to diabetic foot ulcer healing rates Margolis et al. (2015). In a cross-sectional, a short test was given to test

general health literacy, diabetic health literacy, self-efficacy, and diabetic numeracy. The study showed that health literacy, in the treatment of diabetic foot ulcers, could have an impact on positive outcomes, with respect to healing (Margolis, 2015). The study also showed that many times, individuals with lower health literacy are less likely to volunteer to participate. Participants were a small group from a large urban wound center. A limitation of this study is that that results may not be applicable to other urban groups (Margolis, 2015).

Reda conducted a study in 2012 that explored the effect of a preventive foot care program on lower extremity complications in diabetic patients with ESRD. Participants consisted of 123 North American Indians, Aboriginals, and native Canadians, in a randomized control study. The study was carried out in a university hospital dialysis unit. Health literacy and health behaviors were measured. The Wilcoxon rank-sum and chi-square test were used to analyze results. The study found no statistical significance related to the diabetic foot program (Reda, 2012). A limitation of the study was that they used a small group of participants, the majority of whom were Aboriginal. Another limitation is that the exams were not consistently performed by the same clinicians (Reda, 2012).

Diabetic Education and Educational Styles

Karter and colleagues' 2009 study, "Educational Disparities in Health Behavior," sought to identify the relationship, if any, between low educational levels and poor diabetic self-care, across 8,763 participants. Participants were randomly selected from a multi-center setting. An algorithm survey, endorsed by CASRO, was administered to participants. The independent variables were smoking, exercise, blood glucose monitoring, foot exam, health-seeking behavior, and health education. The dependent variable was diabetic self-care (Karter et al., 2009). The measures were hierarchical

logistic regression model, and Healthy Behaviors. The results revealed that participants with lower educational levels perform diabetic self-care less frequently. A limitation of the study is that all participants were from one health plan (Karter et al., 2009).

The purpose of Richards and Cornish's (2018) study, "Reaching out to Diabetic Soles: Outreach Foot Care Pilot Project," was to improve diabetic foot care for seniors through home care. The qualitative study, which included 20 participants, was conducted in the patients' home. The researchers found an increase in health literacy, related to the diabetic foot among the senior population. Quality of life, diabetic knowledge, and healthcare questionnaires were used as survey tools, establishing an increase in health literacy. A limitation of this study is the small participant group (Richards and Cornish, 2018).

Monami (2015) conducted a study with 120 participants placed in two, equally divided groups. The first group received a short-term educational program and the second received traditional care (Monami, 2015). The educational program provided instruction, in groups of five to seven people at a time, with the total intervention time lasting no more than two hours. Time with the physician was restricted to 15 minutes and the nurse engaged the patient for the rest of the time (Monami, 2015). Researchers dedicated 30 minutes to education on foot care and diabetic foot ulcer prevention. The remainder of the time was spent on an interactive patient session, with practical exercises that can reduce the risk of diabetic foot ulcers. Leaflets were also provided to patients, outlining the information taught during the intervention. A patient interpretation of neuropathy questionnaire was administered to test patient knowledge before and after the intervention. The results of the test reflected a significant difference in diabetic neuropathic foot knowledge. The study was prematurely discontinued due to a significant difference between the education group and the traditional care group (Monami M, 2015).

Burke et al. (2014) recognize the benefit of diabetic education. The author finds that for diabetic self-management, it is important that enough information is provided to individuals attempting to make positive health care changes (Burke, 2014). The author also emphasizes that patient participation is vital to making healthy behavior changes, arguing that diabetic educators have the skills to approach patients on an individualized basis to improve outcomes (Burke, 2014). The article suggests that expanding the reach of the diabetic educators to work in primary care and clinics will be beneficial to patients struggling with controlling their blood sugar. Moreover, the article suggests that the medical community will also be improved by ensuring staff are skilled in the instruction of diabetic treatment. Finally, the possibility of a reduction in financial burden would be a further benefit to the community and the patient (Burke, 2014).

A nurse-driven, diabetic education study, conducted in the VA, included 166 patients who received instruction, with a control group of 977 people (Mendez, 2016). The study began with nurses using random pieces of instruction and spending time teaching uncontrolled diabetic patients (Mendez, 2016). The nurses created a diabetic education program, using the information that was available, and implemented the study. The results revealed there was a significant difference in hemoglobin A1C's. The study was found to be successful, but is not yet certified by certified diabetic educators (Mendez, 2016).

The fotonovela is an educational tool, which uses storytelling and entertainment (Rodríguez, 2017). The fotonovela incorporates a cartoon format, displaying photographs of people with bubble captions, and dates back to the Second World War in Italy. The fotonovela became part of Mexican pop culture in the 50's, 60's, and 70's. It became an entertaining and educational tool in the United States in the 80's. This method of education remains popular among the Latino population and is used to provide instruction on health literacy to improve knowledge and quality of

life (Rodríguez, 2017). The National Diabetes Education Program (a program of the National Institute of Health) and the Center for Disease Control identified recent neuroscientific states that storytelling is an effective mode of education (Rodríguez, 2017). The imagery response model can elicit empathetic responses and takes patients to another level of consciousness, allowing patients to place themselves in the story (Rodríguez, 2017).

Unger (2009) conducted a study entitled “Sweet Temptations,” using the fotonovela platform to educate Hispanic adults in Los Angeles, CA on diabetes and diabetes treatment. A total of 311 participants completed surveys before and after reading the fotonovela. The fotonovela illustrates the symptoms, prevention, and treatment of diabetes in a storytelling format. The study took place at an adult school where students were given a pre-test, followed by a 24-page fotonovela book to read. A post-test was also administered, assessing diabetic knowledge (Unger, 2009). The behavioral assessment was comprised of four questions, scored on a four-point scale, with each question valued at one point. The resulting data was analyzed with a paired *t*-test (Unger, 2009). Multiple regression was used to determine if any demographic variables significantly affect knowledge and behavioral intentions. The results revealed that the observed increase in knowledge and attitudes were significant, and, at least in this respect, the fotonovela may be a useful tool in diabetic education (Unger, 2009).

The “Sweet Temptations” fotonovela study was duplicated in the Netherlands in 2018 (van't Jagt, 2018). That study had 202 participants between the ages of 16 and 65. Of those 202 participants, 89 were determined to have low literacy and 113 people were determined to have high literacy. The groups were randomly assigned to one of three conditions: a fotonovela condition (translated to Dutch), a traditional brochure condition, and a control condition (van't Jagt, 2018). Participants in the fotonovela group scored significantly higher than the other groups. These results support the argument that the

fotonovela can be useful in different cultures and languages, effectively increasing diabetic knowledge (van't Jagt, 2018).

A study by Bertera (2014), conducted in Washington D.C., used a format, which combined the African American tradition of storytelling and the Hispanic tradition of a fotonovela platform (Bertera, 2014). This combination of diabetic education in a storytelling and fotonovela format, was implemented in a lower-income African American affordable senior residence (Bertera, 2014). Some of the African American residents of the affordable housing community were recruited to tell their story on the slideshow. The researchers recruited 212 participants, with an average age of 72. The topics addressed dietary management to control diabetes, stepping towards a more active lifestyle (foot care and physical activity, taking charge of your health, know your ABC's), and methods to control high blood pressure. Assessments were performed before and after the interventions. The results demonstrated a significant improvement in diabetic and hypertension knowledge, but also revealed improvements in self-efficacy, which resulted in improved self-management of diabetes and hypertension, among the African American population (Bertera, 2014).

Summary: Literature Review

Diabetes is a disease process that affects quality of life for many people. Significant lifestyle changes are required to manage and control the diabetic disease process and prevent devastating life-changing complications (Trikkalinou, et al 2017). Improvements in the outcomes of diabetes are achievable, contingent on patient adherence to the recommended course of management strategies. Instructional material must be individualized to the health literacy levels of particular patients in order to be successful in improving self-management (Koonce et al., 2015). Patients must also be motivated to participate in planning a pathway that can lead to success for their lifestyle,

which can be challenging even for patients with formal training. It is axiomatic that patients without formal training will have a more difficult time adhering to the required lifestyle changes (Funnell, 2004 and Martin, 2005). According to the CDC, 37% of people diagnosed with diabetes have not had formal training (Center for Disease Control, 2017).

According to some studies, 70% of people who require complex treatment and lifestyle changes are not successful in sustaining health behaviors (Martin, 2005, Margolis, 2015, and Funnell, 2004). These studies also identify effective communication between providers and patients, as an important feature in improving adherence to diabetic life-style changes (Adams, 2016, Martin, 2005 and Middleton, 2013). An ADA article concurs with Martin's (2005) findings, but added that including patients in the planning process can further improve adherence. The approach to the instruction of patients with chronic disease could be improved (Funnell, 2004), particularly since instruction and recommendations for chronic condition regimens are currently being communicated in the same way information is communicated for acute illnesses. The long-term nature of chronic conditions means that information would be better delivered by a more appropriate approach such as the foundational principles Funnell (2004) identified: giving patients an opportunity to make a choice, permitting patients control, and ensuring that patients understand the consequences of their actions. These three principles can be the foundation of a new approach to instructing patients. Adherence will improve if patients are encouraged to participate in care planning, related to their health regimen. If patients can combine their health regimen into their current lifestyle, with consideration of challenges to overcome, the outcomes will improve (Funnell, 2004)

Health literacy is a significant feature of evaluating the efficacy of educational medical material (Koonce, 2015). Patient's failure to understand has a direct impact on their adherence to a diabetic treatment regimen. The health literacy studies reviewed

found that people with lower health literacy had a higher rate of non-adherence to the recommended treatment (Margolis, 2015). The studies encourage the creation of educational material that can improve the understanding of diagnoses and treatment, at the health literacy level of individual patients (Burke, 2014).

Effective education is essential to self-efficacy, adherence to prescribed disease regimen, and improving health literacy, which, in turn, can lead to better outcomes and improved quality of life. The studies explored different methods of education in the diabetic population. One study suggested that certified diabetic educators can improve individual outcomes if they are employed in primary care, outpatient clinics, and in the community to provide diabetic education and increase diabetic knowledge in several different community programs (Burke, 2014). Other studies assessed communication and education using the fotonovela and storytelling method of instruction. The fotonovela and storytelling method of instruction proved to be effective among the low health literacy diabetic population in both studies that explored this method of instruction (Unger, 2009).

In conclusion the literature supports the need for different types of educational tools for diabetic management. The diabetic educational material can assist in the fight against diabetic complications if they are created with the intention to appeal to a broad level of health literacy levels, include methods to increase adherence, and implement creative educational formats that engage the patient in planning and self-care management (Funnell, 2004, Unger, 2009, Koonce et al., 2015).

CHAPTER 3: METHODOLOGY

CHOICE is a research pilot that will test the effectiveness of *The Diabetic Foot Book*. DPN can lead to pre-ulcerative callus, foot deformity, foot ulcers, and amputations. CHOICE is a project that will use *The Diabetic Foot Book*, a patient education booklet,

created explicitly for the DPN population. The goal of the pilot study is to evaluate the efficacy of *The Diabetic Foot Book* in increasing DPN knowledge.

DPN and other diabetic complications are preventable (Caraces, 2017, Tusso, 2014, and Nickerson, 2012). The prevalence of DPN raises concerns regarding the current methods and approach to educating patients about the disease process. *The Diabetic Foot Book* was created to offer an alternative means by which to address the gap between the prevalence of DPN and knowledge of the disease process. The educational material is presented in a story format, which uses the diabetic journey of Diabetty, a woman who has recently complained of numbness in her feet. The participants of the pilot study were recruited from the Sacramento Foot and Ankle clinic in Sacramento, CA. A convenience method was used to recruit a total of eight participants. One participant was excluded, due to not taking the post-test. Participants in the pilot study were instructed in small groups of three or fewer. A pre and post-test was created in the Qualtrics online survey system that used the ExpertReview powered by IQ. The system review included the questions in the survey are clear and concise.

The survey questions in the pilot study were created to establish the efficacy of *The Diabetic Foot Book* to increase baseline DPN knowledge. The survey questions were tested by 10 individuals over the age of 21 and they all stated the survey questions were easy to understand. Future steps in the research process will require rigorous testing of the survey questions to establish reliability and validity of each question.

Purpose

The purpose of CHOICE was to test a new educational tool created specifically for patients diagnosed with DPN. Tests were administered in smaller groups to allow time for feedback and to allow participant engagement in relating personal experiences to

those of the fictional character, Diabetty. Participants were also given an opportunity to learn from the experiences of other group members.

Justification for a Study Involving Humans

The CHOICE pilot study is strictly educational. No hands-on medical care was provided during the intervention. Participants were allowed to share their personal diabetic experiences with each other. No coercion or pressure to participate in sharing personal experiences was exerted. Patients randomly shared their experiences in the small groups.

Aim of the Study

The study instructed participants diagnosed with DPN to increase knowledge related to diabetes, DPN, and foot care. Educational material was presented in novella format and instruction was provided to groups of three or fewer participants. The pilot study aims to validate the efficacy of *The Diabetic Foot Book*.

Hypothesis

The Diabetic Foot Book is effective with respect to increasing knowledge related to diabetes, DPN, and foot care in patients with DPN who are 21 years of age and older.

Relevance

The information yielded from the study is relevant to practitioners and patients. *The Diabetic Foot Book* is an educational tool aimed at people with DPN, offering an alternative approach to encouraging patient behavior modification and decreasing the risk of diabetic complications, which can result in foot ulcers and lower-extremity amputations.

Subjects

The study recruitment team attempted to recruit at least 30 participants; however, only 8 agreed to participate and one was excluded, due to an incomplete questionnaire. All participants were recruited from the Sacramento Foot and Ankle Clinic. Inclusion criteria for participants were a diagnosis of DPN, placing them at risk for pre-ulcerative callus diabetic foot ulcers, and lower extremity amputations. Participants were older than 21 years of age and fluent in English. Recruitment efforts began one month prior to the intervention. All participants in the study gave their consent. There were no problems or risks noted by the participants during the pilot study. The pilot study was approved by the California State University Fresno IRB committee.

Benefits

This pilot study evaluated an educational tool that has the potential to increase diabetic knowledge in people of a wide range of health literacy levels. The study evaluated *The Diabetic Foot Book* effectiveness as an educational tool for patients diagnosed with DPN. Increasing DPN knowledge has the potential to begin the process of changing behavior. Appropriate changes in behavior will improve quality of life, decrease the financial burden on the patient and health system, and empower the patient to make further healthy behavior decisions. *The Diabetic Foot Book* is a novella-style educational tool that has the potential to communicate information in a format that can increase the knowledge of the patient's diagnosed with DPN. The benefit to society is a healthier population of people with DPN, due to an increase in knowledge about the DPN disease process (Gallman, 2017).

Potential Risk

There was minimal risk with the CHOICE pilot study. The CHOICE project will not perform any hands-on intervention with patients. *The Diabetic Foot Book* will be used to instruct the patient on diabetes and care of the diabetic foot.

Precautions

The pre-test, post-test, and coding was performed by Qualtrics, which is a secure site. The data was stored on an external drive that was locked in a safe. Data was destroyed after completion of the pilot study. Participants confidentiality was protected through using a number to identify the participant rather than their names. Test results were displayed as an anonymous cohort.

Compensation

A copy of *The Diabetic Foot Book* and a \$30.00 honorarium was provided to participants.

Methods

The recruitment process consisted of placing flyers and informational brochures at the Sacramento Foot and Ankle Clinic. An interest sheet was created, and the podiatrist and medical assistants at the site informed patients about the study. The researcher also spent time at the Sacramento Foot and Ankle clinic to speak with patients about participating in the pilot study. Participation in the pilot study was voluntary. The pilot study took place over one month, beginning in October and ending in November. Patients were instructed in small groups of less than three people. The intervention was a novella-style educational tool called *The Diabetic Foot Book*, created specifically for patients with DPN. A pre and post-test was performed to measure changes in DPN knowledge. The intervention consisted of a pre-test, which was followed by one hour of intervention, giving instruction to the participants using *The Diabetic Foot Book*. The

intervention was limited to groups of up to three participants. The study was performed at The Sacramento Foot and Ankle Clinic.

CHAPTER 4: RESULTS

The Diabetic Foot Book was created as a tool to decrease the knowledge gap for people diagnosed with DPN. *The Diabetic Foot Book* was tested in a pilot study performed at the Sacramento Foot and Ankle Clinic. A total of seven patients participated in the pilot study. The study intervention consisted of a pre-test of 21 questions, including demographic information, basic diabetic knowledge, DPN knowledge, and diabetic foot care knowledge. The intervention involved presenting the diabetic experience of Diabetty, allowing participants to express their diabetic experience in relation to Diabetty. The intervention was implemented in groups of three or fewer.

Results

Figure 1. Race

Figure 2 gender

Figure 2. Gender

Figure 3. Age

Table 1 pre-test questions shows the list of the percentage of correct/incorrect answers.

Table 1. Pre-Test

Pre-Test Questions	Correct Percentage	Incorrect Percentage
What causes Diabetic Peripheral Neuropathy?	100%	0%
What are the complications of Diabetic Peripheral Neuropathy?	85.7%	14.29%
The Complications of Diabetes are?	100%	0%
Is there a cure for Diabetes or Diabetic Peripheral Neuropathy?	57.14%	42.86%
Is a blood sugar of 250 in normal range?	85.71%	14.29%
What is a hemoglobin A1C?	100%	0%
People with Diabetic Peripheral Neuropathy will see the Podiatry team every 9 weeks for the rest of their lives	85.71%	14.29%
What is a callus?	71.43%	28.57%
Callus	85.71%	14.29%
If you see a sore on your foot you should?	100%	0%

When check your feet if you see a red swollen foot with a sore you should call the doctor	100%	0%
People with diabetes should moisturize their feet daily and avoid placing lotion between the toes	57.14%	42.86%
People with diabetes should check their feet for sores daily	100%	0%
Callus on the feet lead to sores	100%	0%
Sores on the feet lead to amputation	85.71%	14.29%
Diabetic Peripheral Neuropathy change the way people walk which can lead to callous on the feet	100%	0%

Table 2 shows the list of post-test questions and the percentage of correct/incorrect answers.

Table 2. Post-Test

Post-Test Questions	Correct Percentage	Incorrect Percentage
What causes Diabetic Peripheral Neuropathy?	100%	0%
What are the complications of Diabetic Peripheral Neuropathy?	100%	0%
The Complications of Diabetes are?	100%	0%
Is there a cure for Diabetes or Diabetic Peripheral Neuropathy?	85.71%	14.29%
Is a blood sugar of 250 in normal range?	100%	0%
What is a hemoglobin A1C?	85.71%	14.29%
People with Diabetic Peripheral Neuropathy will see the Podiatry team every 9 weeks for the rest of their lives	85.71%	14.29%
What is a callus?	100%	0%
Callus	100%	0%
If you see a sore on your foot you should?	100%	0%

When check your feet if you see a red swollen foot with a sore you should call the doctor	100%	0%
People with diabetes should moisturize their feet daily and avoid placing lotion between the toes	100%	0%
People with diabetes should check their feet for sores daily	100%	0%
Callus on the feet lead to sores	100%	0%
Sores on the feet lead to amputation	100%	0%
Diabetic Peripheral Neuropathy change the way people walk which can lead to callous on the feet	100%	0%

Figure 3 shows a graph of pre and post-test results expressed in a percentage.

Figure 3. Pre and post-test results.

Table 3 shows the results of responses to the qualitative question: Does the information presented in the Foot Book increase your understanding of Diabetic Peripheral Neuropathy?

Table 3. Qualitative Question Results.

#	Answer	%	Count
1	A great deal	57.14%	4
2	A lot	28.57%	2
3	A moderate amount	14.29%	1
4	A little	0.00%	0
5	None at all	0.00%	0
	Total	100%	7

Analysis of Results

The hypothesis for the CHOICE pilot study is *The Diabetic Foot Book* increased DPN knowledge in patients diagnosed with DPN, who are 21 years of age and older. The CHOICE pilot study was a convenience pilot study, with seven participants, treated at The Sacramento Foot and Ankle podiatry practice in Sacramento, CA.

Test questions consisted of 17 DPN and diabetic foot care knowledge test questions. The test questions results were compared to establish degree and difference in knowledge base, before and after the pilot study intervention. Results revealed an increase in DPN knowledge post intervention. One additional question was asked at the end of the post-test to ascertain participant perceptions of the usefulness of *The Diabetic Foot Book*. Demographic questions and the question related to participant perception of *The Diabetic Foot Book*, were not used in the calculation in the final results of the pilot study results.

Test scores, post intervention, were higher than those on the pre-test. However, due to the small sample size the test results are not generalizable to the DPN population. The results of the patient perception question regarding the usefulness of *The Diabetic Foot Book* showed that over half of the participants (57.5%) found the book to increase their knowledge a great deal, 28.5% of the participants stated that *The Diabetic Foot Book* helped a lot, and 14.29% reported that *The Diabetic Foot Book* helped a moderate amount. All patients identified *The Diabetic Foot Book* as helping to increase DPN knowledge.

The pilot study addressed topics relating to basic diabetic and DPN knowledge, such as normal blood glucose parameters, complications of diabetes, causes of DPN, questions related to foot care, calluses, diabetic foot sores, and lower extremity amputations. All participants in the pilot study answered 8 of the 17 questions correctly

on the pre-test. Correct answers increased to 14 out of 17 following the pilot study intervention. Only two of the seven participants did not receive a perfect score on the post-test. All questions were given a value of one point.

The Diabetic Foot Book was constructed as a tool to close the knowledge gap in patients diagnosed with DPN. Funnell (2004) identified three principles to improve adherence and diabetic outcomes: choices, control, and consequences. It is important that the patient is able to make an informed choice, understand how to control the disease process, and the consequences of non-adherence. *The Diabetic Foot Book* encompassed all three principles. Comments made by several participants about *The Diabetic Foot Book* suggest that it increased understanding by presenting all components of the disease process together.

CHAPTER 5: CONCLUSION

Diabetes is a prevalent disease, growing at a rate of 5% every year in the United States of America (Center for Disease Control, 2017). Complications resulting from diabetes can be devastating, but are preventable, if controlled (National Center for Chronic Disease Prevention and Health Promotion, 2017). The CHOICE pilot study was an effort to provide an educational tool that engages and educates those diagnosed with the diabetic complication of DPN, a condition which can lead to diabetic foot ulcers and amputation, if not adequately managed. A story book format was used to appeal to and engage a diverse group of people diagnosed with DPN, and is adaptable to a wide range of health literacy levels.

The ITBHC was used as the foundational framework of *The Diabetic Foot Book*. *The Diabetic Foot Book* was structured with the goal of impacting knowledge and belief, self-regulation, and social facilitation. The information in *The Diabetic Foot Book* reinforced existing knowledge, corrected inaccurate information, and increased

knowledge amongst participants. A goal of the pilot study was to determine whether instruction on diabetes and DPN contributed to improving participant knowledge, providing a foundation for changing beliefs and health behaviors, resulting in self-regulation. Participants were allowed to discuss their diabetic experience in relation to one another and the character presented in *The Diabetic Foot Book*, encouraging patients to set goals, position themselves as integral parts of their health care team, and as decision-makers in terms of their care. Social facilitation refers to the structures of social support and influence, in respect of changing and maintaining behaviors and beliefs about a disease process toward improving their condition (Ryan, 2009). The CHOICE project provided social facilitation while attempting to influence the participant's way of thinking and engaging in their health care. While this pilot study was very small, participant response was positive.

Limitations

The limitations of the CHOICE pilot study include the small sample size and, although the population was diverse, it was not indicative of the general population, as it was from one clinic. The study was also limited by a lack of voluntary candidates for participation in the study. Further, the participant pool did not include caregivers who may help participants understand the concepts and encourage them to gradually make changes in behavior (Baig, 2015, Bennich, 2017, Siminerio, et.al, 2018). The primary language of a large population of the Sacramento Foot and Ankle practice was Russian and Spanish, and because of this, they were excluded from the pilot study.

Recommendations

The CHOICE pilot study criteria should be broadened to include two groups of people; newly diagnosed DPN patients and DPN patients that are having difficulty managing the complications of DPN. Patient readiness is essential to receiving new

information, perhaps the impending risk of complications of DPN, and the existing complications in the second group of patients will activate the patient's readiness to receive instruction (Adams, 2010). Both groups of people can benefit from the information provided in *The Diabetic Foot Book*. The program can be tested on a larger scale, and the concepts can be reinforced during the period of participant care in podiatry. The purpose of the CHOICE pilot study was to establish the efficacy of *The Diabetic Foot Book*. The next step would be to reproduce the pilot study on a larger scale, inclusive of patients from multiple clinics. Use *The Diabetic Foot Book* as an introduction to podiatric services to instruct patients on what can be anticipated after being diagnosed with DPN. The process will be structured to allow patients to express what care goals they can implement. Implementation of this process will foster communication and patient involvement as part of the team in planning their care goals. Furthermore, this study recommends including caregivers and family members in the initial introduction to podiatry, using *The Diabetic Foot Book*. The final recommendation is to provide *The Diabetic Foot Book* in different languages to appeal to a larger population.

The Diabetic Foot Book is one educational tool that can be used to provide the education and support necessary to encourage behavior change, at a point when a new complication has been identified that can negatively affect the quality of life.

The diabetic community continues to grow to pandemic numbers. Diabetes and its accompanying complications can be devastating, and if uncontrolled, can lead to premature mortality (University of St. George's, London, 2012). Management of diabetes to maintain adequate health status requires the participation of the patient and changes in their health behavior (Funnell, 2004). The CHOICE pilot study is a project that sought to evaluate, *The Diabetic Foot Book*, which was used to educate the DPN

patient on diabetic foot care, DPN complications, and measures to manage and slow the progression of DPN.

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APPENDICES

APPENDIX A: THE DIABETIC FOOT BOOK

The Diabetic Foot Book

A Guide to Diabetic Foot Care

By Alishia A. Claibourn, MSN, CWCN

The Diabetic Foot Book

By Alishia Claibourn, MSN, CWCN

Meet Diabetty. Diabetty is a 45 year old woman, who has diabetes. Diabetes is a disease that occurs when your blood sugar is too high.

Recently, Diabetty has been experiencing tingling in her feet. In speaking to the doctor, Diabetty learned she has Diabetic Peripheral Neuropathy.

What is Diabetic Peripheral Neuropathy?

Diabetic Peripheral Neuropathy is nerve damage to legs, feet, and hands, due to high blood sugar.

The doctor informs Diabetty that she will have to be seen by the Doctor of Podiatric Medicine (DPM) the foot doctor.

Diabetic Peripheral Neuropathy Signs and Symptoms

- **Numbness and tingling in your feet**
- **Muscle weakness in your legs and feet**
- **Unable to feel pain in your feet**
- **Burning sensation in your legs and feet**
- **Loss of balance**
- **A feeling that pins are being stuck in your feet**
- **Changes in the shape of your feet**

Diabetty did not like what the doctor told her. She decided that she would not go to the podiatrist, and she would continue to live her life without any changes in her behavior.

One day, Diabetty was getting out of the shower and noticed bloody footprints on the bathroom floor. When she looked at her feet, they were swollen and red. Diabetty immediately went to the hospital.

Diabetty was admitted to the hospital with an infection that spread into her blood.

The doctor told Diabetty that she was fortunate the infection did not spread to her bones.

The doctor said if the infection spread to Diabetty's bone, she could have lost her leg.

The doctor reviewed diabetes with Diabetty

DIABETES

Diabetes is a disease that occurs when your blood glucose, also called blood sugar, is too high. Blood sugar is the main source of energy, which comes from eating food. Insulin is a hormone made by the pancreas. The pancreas is an organ that releases insulin to help food get into your cells to be used for energy. In people with diabetes, sugar stays in the bloodstream and is not able to be used for energy, due to the following:

- **Not enough** insulin is made by the pancreas
- **No** insulin is made by the pancreas
- The body is **unable to use** the insulin

Diabetes is a gateway disease

Complications of diabetes lead to

❖ Heart disease

❖ Stroke

❖ Blindness

❖ Amputations

❖ Nerve damage

❖ Kidney damage

Is there a cure for diabetes?

NO!

**But diabetes can
be managed**

What can I do to manage my diabetes?

- ❖ Know Your ABCS
  - ❖ **A**1C Hemoglobin level
  - ❖ **B**lood Pressure
  - ❖ **C**holesterol level

- ❖ Eat a healthy diet.

- ❖ Exercise

- ❖ Check your blood sugar at least once a day

CHECK their BLOOD SUGAR

- When they wake
- Before meals
- 2 hrs after meals
- At Bedtime
- Middle of the night

When they are high ↑ Low ↓ Sick ☹

- ❖ Keep routine foot doctor appointments

Diabetty's profile

Hemoglobin A1C - 8.5

- ❖ Normal range is 4.0%-5.6%
- ❖ Pre-diabetes range is 5.7%-6.4%
- ❖ Diabetic range is 6.5% and above

Cholesterol- 250

- ❖ Normal range is 125-200

Blood pressure- 172/95

- ❖ Normal range is 120/80
- ❖ Stage 1 high blood pressure range is 130/80- 139/89
- ❖ Stage 2 high blood pressure range is 140/90 or higher
- ❖ Blood pressure higher than 180/120 is considered a crisis

Diabetty's plan

- Diabetty took lots of notes during her review of diabetes.
- Diabetty's doctor made a referral to the diabetic nurse case manager to assist her with diabetic management.
- Diabetty knows that behavior change will be difficult, but she is committed to doing her best to manage her diabetes.
- She also has an appointment with the foot doctor (podiatrist) to learn how to care for her feet.

WELCOME TO PODIATRY

A CHANCE to RESET and TAKE
CONTROL of YOUR DESTINY

**How did I end up in
podiatry?**

**How do I stop
diabetes from getting worse
and ending up with diabetic
peripheral neuropathy that
can lead to amputation?**

Control your blood sugar!

Target Blood Glucose For diabetics

• FASTING BLOOD SUGAR:	<i>Less Than</i>	100
• BEFORE MEALS:	<i>Between</i>	70-130
• AFTER MEALS (1-2 hours)	<i>Less Than</i>	180
• BEFORE EXERCISE :	<i>If taking Insulin.</i>	100
• BEDTIME:	<i>Between</i>	100-140

- Check your feet daily
- Report any open sores right away
- Moisturize your feet daily, but avoid placing lotion between your toes
- Wear shoes that fit your feet well

Every member of the podiatry team plays an important part. The podiatrist, the specially trained nurses, and the vendors will work with you to care for your feet as long as you live.

The podiatry team will instruct you on the best options to keep your feet well. Also, the podiatry team will let you know what can happen if you choose options that will hurt your feet. In the end, the decision is always yours.

Teamwork Makes the Dream Work

**PODIATRY
TEAM**

PATIENT

Life in Podiatry

Maintenance

- Appointment every nine weeks for assessment of feet and nail care by the podiatry team
- Moisturize feet daily with a thick lotion
- Wear custom shoes and inserts everyday
- Replace inserts every four months
- Check feet daily
- Report any open area on feet to the podiatry team
- All people with pre-ulcerative calluses will have appointments every four to seven weeks

Wound Care

- Appointments are usually every two weeks. Some wound care procedures require weekly appointments.
- The patient and family must be committed to performing wound care, which may be daily to every other day
- The patient is usually responsible to purchase wound care supplies. Some insurances may pay for supplies
- Wounds on the bottom of the feet worsen from pressure when walking. The more you walk the longer it will take for the wound to heal
- Healing shoe, e-boot, or cast will assist the patient to decrease pressure on the wound

"Keep Life
Sweet, Take
Care of Your
Feet"

Everyone on the Team Has a Responsibility

Patient Responsibility

- Listen to instructions
- Help the provider, understand challenges, if any to performing suggested treatment
- Keep appointments
- Ask questions
- Participate in care planning

Podiatrist Responsibility

- Foot examination
- Ordering custom shoes/ inserts (if eligible)
- Give instruction
- Wound care, as needed
- Surgical intervention, when needed

Specialty Nurse Responsibility

- Foot examination
- Maintenance
- Give instruction
- Nail care
- Callus care
- Wound care

Vendor Responsibility

- Measure feet
- Take mold of feet
- Fit shoes and inserts to the patient's foot
- Give new set of inserts every four months

Will you make the commitment to be part of the team?

Why do people with peripheral neuropathy get wounds?

LOPS = Loss of protective sensation

Because people with peripheral neuropathy don't feel pain!

One habit that Diabetty did not give up was going bare-footed. Even-though she had the new custom shoes and inserts she did not wear them all the time.

Diabetty noticed an area on the bottom of her foot with very thick rough skin.

Diabetty asked the doctor what is the thick skin?

Callus

Diabetty's doctor told her that many times people with Diabetic Peripheral Neuropathy walk differently which causes more pressure over the bones on the feet. This causes the skin to become thicker and very hard like a rock.

People with Diabetic Peripheral Neuropathy can't feel the pain and are unable to protect their feet. The callus becomes so hard that it causes an open sore on the bottom of the foot or toes.

The progression of callus to open sore

How to manage callus

- Appointments with podiatry every 4 to 7 weeks depending on the severity of the callus
- Use a pumice stone to take callus down between appointments
- Moisturize feet with thick lotion daily avoiding the spaces between the toes
- Custom shoes and inserts are ordered to help you take pressure off of the area's at risk for calluses.

Wound care Dos and Don'ts

The Dos	The Don'ts
• Follow wound care instructions • Wear healing shoe, boot, or cast at all times • Check inside shoes before putting them on to make sure no objects are inside the shoe • Perform wound care dressings as instructed • Keep wounds covered; do not leave open to air • Call the podiatry team for any signs or symptoms of infection (redness, swelling, increase in drainage, foul smell, fever, nausea, vomiting)	• Go barefooted • Wear shoes that are too small • Wear shoes that are too big • Soak your feet • Leave wound open to air • Walk without special healing shoe, boot, or cast • Put your feet in any water • Use wound care treatments that the podiatrist (foot doctor) did not prescribe • Miss appointments

Diabetty's follow up telephone appointment

The foot doctor called Diabetty to follow up on how she is doing.

Diabetty told the doctor:

- ❖ She never goes barefooted
- ❖ If she gets a sore on her foot she will call the doctor right away
- ❖ She has been moisturizing her feet daily and does not put the lotion between her toes
- ❖ She has made appointments every 6 weeks to shave callus
- ❖ She wears her custom shoes and inserts
- ❖ She checks her feet daily because she knows she can't feel when she hurts them.
- ❖ She has kept her blood sugar between 100 and 150.

DIABETTY

Diabetty listened to everything her podiatry team taught her. Diabetty felt empowered, when the podiatry team allowed her to make a choice and listened to the challenges she had with some of the recommendations. Diabetty committed to getting the custom shoes and inserts. Diabetty also committed to start working on the suggestions that were discussed and mutually agreed with the podiatry team. Diabetty understands her team is only a phone call away.

Diabetty's Profile

Now

Hemoglobin A1C- 7.5

- ❖ Normal range is 4.0%-5.6%
- ❖ Pre-diabetes range is 5.7%-6.4%.
- ❖ Diabetic range is 6.5% and above.

Cholesterol- 200

- ❖ Normal range is: 125-200

Blood Pressure- 118/80

- ❖ Normal range is 120/80
- ❖ Stage 1 high blood pressure range is 130/80- 139/89
- ❖ Stage 2 high blood pressure range is 140/90 or higher
- ❖ High blood pressure higher than 180/120 is considered a crisis

Diabetty encouraged her friends who have diabetes to work together, and they all made positive changes to their health.

Diabetty Lived a Healthy, Happy Life

**The Beginning
of a New Life**

Diabetic Care Plan- Labs to Follow

Hemoglobin A1C, Creatinine/BUN
Cholesterol, Daily Blood Glucose

LABS	CURRENT LAB RESULTS	GOAL LAB RESULTS
Hemoglobin A1C (Diabetes) Normal Range 5.7%-6.4%		
Daily Blood Glucose 70-130 MG/DL		
Creatinine (KIDNEYS) Normal Range 0.6-1.1MG/D		
Bun (Kidneys) Normal Range 7-20 MG/D		
Cholesterol Less than 200 MG/DL		

Your Health Matters

Diabetes: Daily Blood Sugar and Diet Log

Week of _____	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
My blood sugar level before breakfast							
What I ate for breakfast							
My blood sugar level before lunch							
What I ate for lunch							
What I ate for a snack							
My blood sugar level before dinner							
What I ate for dinner							
My bedtime blood sugar level							
Notes							

Example of an app to help with Diabetic Management

The Glucose Buddy is one of many free apps that can be downloaded to help with diabetic management.

There are many free apps available to be downloaded

Different types of wounds taken care of by podiatry

Complications Of Diabetes

**Diabetic Neuropathic
Ulcer**

**Diabetic Neuropathic
Ulcer**

Dorsal surface

Plantar surface

Ulcerative Callus

Charcot

Compression Solutions

Wounds do not heal in the presence of inflammation/swelling. Compression is used to assist with inflammation.

Profore

Unna Boot

Farrow Wraps

Compression Stockings

Offloading Shoes

The shoes shown below are the offloading shoes, boots, and cast that assist in healing wounds.

Procure shoe

DH Shoe

Darco Shoe offload the heel

Darco Shoe offload the front of foot

Globoped offload the heel

E-boot

Used for Charcot

Total Contact Cast

Knee Scooter

Crutches

Terms That Are Used In Podiatry

- ❖ **Blood Glucose Monitoring**- usually blood sugar levels are taken by the patient daily unless instructed otherwise by the doctor. The patient is able to test their blood sugar using a machine called a glucometer. Performed by simply sticking finger with a lancet (small needle) and placing a drop of blood on the glucometer strip to receive a reading of your fasting blood glucose level.
- ❖ **Calluses**- thickening of outer layer of skin due to pressure and shearing usually found on the bottom of the foot. Can lead to ulcers.
- ❖ **Cellulitis**- bacterial Infection of the skin displayed by redness, swelling and pain.
- ❖ **Charcot**- progressive degenerative disease process which is a long-term complication of diabetes. Due to nerve damage along with severely weakened foot bones debilitating foot deformities occur.
- ❖ **Debridement**- to remove dead or contaminated tissue, or foreign materials. The removal of any material that can cause infection. Debridement can be performed by using a scalpel (knife), or enzymes.

❖ **Diabetes-** a disease that occurs when your blood glucose, also called blood sugar, is too high. Blood glucose is the main source of energy which comes from eating food. Insulin is a hormone made by the pancreas that helps food get into your cells to be used for energy. In diabetes glucose stays in bloodstream and is not effective to generate energy due to any of the following:

- Not enough insulin is made
- No insulin is made
- The body is unable to use the insulin

❖ **Diabetic Peripheral Neuropathy-** nerve damage that is caused by high blood sugar. High blood sugars over a long period of time coupled, with high levels of fats, are key in nerve damage. Symptoms occur in the arms, hands, legs, and feet. Symptoms range from nerve pain to loss of protective sensation.

❖ **E-Boot-** removal Offloading Boot

❖ **Eschar-** a scab or thick crust caused by injury or gangrene.

❖ **Fungal Nails/Onychomycosis-** dry, cracked, brittle nails caused by fungal infection.

- ❖ **Gangrene-** The death of tissue due to loss of blood supply, or a bad infection.

- ❖ **Granulation Tissue-** tissue formed in early wound healing. Tissue has new blood supply to area.

- ❖ **Hemoglobin A1C-** a blood test taken every three months. The test measures the amount of sugar that is coating the red blood cell. This test is an Indicator of blood glucose management over a period of time.

Normal range is	4.0%-5.6%.
Pre-diabetes range is	5.7%-6.4%.
Diabetic range is	6.5% and above.

- ❖ **Inflammation-** a localized reaction that produces redness, warmth, and swelling as a result of infection, injury, wound, or infection.
- ❖ **Loss of Protective Sensation-** inability to recognize pain on the bottom and/or top of the foot with a 10g monofilament wire. Inability to feel the pressure; places the patient at risk for callus, ulcer, or amputation.
- ❖ **Neuropathic Ulcer-** occurs in patients with neuropathy due to loss of sensation to pressure, temperature, or pain; cannot feel pain and damage to foot continues until there is an open sore

- ❖ **Non-weight bearing (nwb)**- the foot should not touch the ground. No walking.
- ❖ **Offloading**-process by which pressure is reduced to assist in healing a foot ulcer
- ❖ **Orthotics**- custom shoe inserts specifically made to assist in correction of biomechanical (poor walking mechanics) problems that cause problems with the foot.
- ❖ **Osteomyelitis**- infection of the bone cells or the bone marrow, which can lead to death of the bone.
- ❖ **Periwound Skin**- skin surrounding the sore (ulcer)
- ❖ **Slough**- devitalised tissue made of fibrin. Tissue needs to be removed in order for the wound to heal.
- ❖ **Total Contact Cast**- non-removal cast that offloads the foot. This method of Offloading the foot is the gold standard

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