Effect of Interactive Education on Self-foot Exams in Type 2 Diabetes

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Abstract

In the United States, 30 million individuals are affected by type 2 diabetes, with all at risk for complications and decreased quality of life. Diabetic foot ulcers and amputations cost $4.9 billion annually in the U.S. but can be prevented through patient-driven self-care. The purpose of this project was to determine if interactive diabetic foot exam patient education impacts self-foot exam frequency and to examine perceived barriers for daily self-foot exams in type 2 diabetic patients over the age of 50 during a five-month period at an outpatient clinic setting. The quasi-experimental project used a single group design with pre and post-intervention evaluation. Participants from convenience sampling included 106 patients from a Midwest outpatient medical practice. The evidence-based project intervention included written and verbal interactive education emphasizing the skills, ease, and importance of daily self-foot exams. The number of diabetics who perform self-foot exams was assessed before and after the educational intervention, along with patient-perceived barriers to performing daily self-foot exams using the Diabetic Foot Ulcer Health Belief Scale. The number of patients who reported performing daily self-foot exams was higher than expected on the pre assessment. Interactive education prompted increased self-foot exams in 74 paired pre-post assessments. The published evidence and project results support that healthcare providers should discuss specific self-foot exam criteria when educating and assessing the frequency of daily self-foot exams. Emphasizing the importance of diabetic self-foot care while being mindful of common barriers can increase patient performed exams and lead to improved outcomes.

*Keywords:* type 2 diabetes, interactive education, foot ulcer, self-foot exam
Effect of Interactive Education on Self-foot Exams in Type 2 Diabetes

There are 30 million people diagnosed with type 2 diabetes in the U.S., and an additional 84 million who have pre-diabetes, with rising numbers annually (Centers for Disease Control and Prevention [CDC], 2018). Diabetes often leads to adverse health states, affecting psychological, cardiac, renal, neurologic, and vascular systems (CDC, 2018). Patients frequently develop peripheral neuropathy (see Appendix A) and ischemia, which often goes undiagnosed (Jarrett, 2013). The lifetime risk of developing a costly diabetic foot ulcer (see Appendix A) for people with diabetes is approximately 25% (Boulton et al., 2008, p. 1679; Driver, Fabbri, Lavery, & Gibbons, 2010). Diabetic foot ulcers are painful and often result in amputations, debilitating loss of mobility and productivity, decreased quality of life, and increased morbidity and mortality (Jarrett, 2013; Wied et al., 2018). Age is positively correlated with increased incidence of foot ulcers, more frequent and extended hospitalizations, and higher costs of care for patients with type 2 diabetes (Levit et al., 2011; Margolis et al., 2011).

**Economic and Health System Significance**

Diabetes creates a tremendous economic burden on the U.S. health care system (CDC, 2018; Driver et al., 2014; Margolis et al., 2011). In 2012, diabetes costs totaled $245 million, including direct care and lost wages (CDC, 2018). To curtail these costs and to provide standardized preventive goals of care, the U.S. Department of Health and Human Services (USDHHS) established evidence-based goals for diabetic patients, which were published in Healthy People 2010 and Healthy People 2020 (U.S. Department of Health and Human Services [USDHHS], 2018). These include a target to increase the proportion of adults with diabetes who have at least an annual foot examination, which showed improvement from 68.0% in 2008 to 74.8% in 2020 and decrease the number of diabetes-related amputations (USDHHS, 2018).
Although inadequate rates of annual foot examination have persisted, there has been some improvement in recent years; in 2002, 67.1% of diabetic patients in the U.S. received at least an annual foot exam by a provider (USDHHS, 2018).

**Local Issue**

Diabetes significantly affects Missouri residents (American Diabetes Association [ADA], n.d.; Missouri Department of Health and Senior Services [MDHSS], 2017). In 2015, over 539,600 adults were diagnosed with diabetes (MDHSS, 2017). Projects implemented through the MDHSS for patients with diabetes in Missouri include monitoring HgbA1C levels with a target goal of < 9%, the number of eye exams, the number of kidney screenings, and the number of provider foot exams (MDHSS, 2017). Program outcomes do not include the number of patient self-foot exams (MDHSS, 2017). Current results of self-foot exams for Missouri are not available for comparison to the Healthy People 2020 target of 74.8% (MDHSS, 2017; USDHHS, 2018). The percentage of Missourians who received formal diabetic education is also not available for comparison with the Healthy People 2020 target of 62.5% (MDHSS, 2017; USDHHS, 2018).

**Diversity Considerations**

Patients diagnosed with diabetes in Missouri are disproportionately African American, 45 years of age or older, and female (MDHSS, 2017, p. 3). Diabetes rates for all non-white racial and ethnic populations are significantly higher than whites in Missouri (MDHSS, 2017). A significant proportion of adults with diabetes in Missouri had an annual income of $24,999 or less and did not graduate from high school (MDHSS, 2017, p. 3). Missouri diabetics with lower extremity amputations attributed to diabetes are more likely to be African American males (Hospital Industry Data Institute, 2015).
Problem and Purpose

Many patients with diabetes receive inadequate care that does not meet the goals set by experts and governmental agencies (ADA, 2018, Standards of medical care; Driver et al., 2010; USDHHS, 2018). Diabetics who do not receive adequate care have an increased risk of preventable foot complications and death (Wied et al., 2018). Targets for diabetic education and foot care established decades ago have still not been met (USDHHS, 2018).

The purpose of this project was to discern if interactive diabetic foot education increased diabetic self-foot exams. This evidence-based project was designed to empower, educate, and encourage patients to perform daily self-foot exams (see Appendix A) and to increase the delivery of diabetic education according to USDHHS and ADA guidelines (ADA, 2018, Standards of medical care; USDHHS, 2018). Education was tailored to accommodate economic, social, and educational disadvantages (MDHSS, 2017). A secondary purpose of this project was to explore behavioral barriers to daily self-foot exams. Increased education and foot exam frequency are needed to prevent costly amputations and poor outcomes (Driver et al., 2014; Wied et al., 2018).

Facilitators and Barriers

Facilitators included evidence-based guidelines, the enthusiasm of the staff, and supportive practice providers (ADA, 2018, Standards of medical care; USDHHS, 2018). Several members of the staff displayed additional enthusiasm and interest, informally serving as project champions. The office electronic medical record aided in patient identification for weekly appointments. Rates of foot exams and behavioral considerations from previously published studies were included to provide a baseline for benchmarking (Chin, Huang, & Hsu, 2012;
Pocuis, Li, Janci, & Thompson, 2017). A low projected cost of $2,122.28 (see Appendix B) facilitated implementation during the project and would assist implementation in the future.

Barriers included a time-consuming change to practice, self-reported patient outcomes, student investigator bias, and lack of generalizability. Initial surveys were completed by patients in writing. Follow up was conducted by phone which could have affected patient responses. To facilitate practice change, project statistics including enrollment numbers were shared weekly when new patient rosters were emailed to the office to create a sense of urgency, purpose, buy-in, and vision (Kotter, 1995). Obtaining a large sample size promoted generalizability.

Sustainability for the diabetic self-foot exam project was positively affected during implementation through the use of the office electronic medical record (EMR). The EMR had the capability to readily display diagnosis and age in patient charts. Patient-reported outcomes and quality measures could be monitored and queried by adding specific data fields to the EMR patient template. Reported enrollment data assisted with identification and recruitment which could also be used for future project continuation.

**Evidence Search and Review**

The primary aim of this project inquiry was, in type 2 diabetic adult patients over the age of 50, does interactive diabetic foot exam patient education, as compared to no interactive diabetic foot exam patient education, impact patient self-foot exam frequency for daily self-foot exams during a five month period in an outpatient clinic setting. Perceived barriers to self-foot exams were explored as a secondary inquiry. The keywords type 2 diabetes, interactive, education, diabetic foot ulcer, and diabetes foot exam were used in the Cumulative Index to Nursing and Allied Health (CINAHL), Medline, Education Resources Information Center (ERIC), and Cochrane Library databases. Pediatric studies were excluded.
Studies were ranked by a hierarchy of evidence according to the *Rating System for the Hierarchy of Evidence for an Interventional Inquiry* (see Appendix C; Melnyk & Overholt, 2015, adapted). Search results included: Systematic review with meta-analysis of randomized controlled trials (1 study, 2 guidelines), level I; Systemic review without meta-analysis (1 study), level II; Randomized Controlled Trials (2 studies), level II; Quantitative Quasi-experimental (1 study), level III; Qualitative Quasi-experimental (mixed study, 1 study), level VI and III; Uncontrolled Cohort (4 studies), level IV; Cross-sectional (3 studies), level IV; Case-Control (1 study), level IV; Descriptive with Quantitative Approach (1 study), level VI; Qualitative Descriptive (2 studies), level VI; Qualitative Descriptive (1 study), level VI; Single Case Study (1 study), level VII; Literature Review (1), level VII; Expert Opinion (3 guidelines), level VII.

**Synthesis of Evidence**

Three themes emerged from the evidence (see Appendix D). First, there is a major medical and economic burden of care. Inadequate diabetic foot care significantly affects diabetic patients and society as a whole (Banuelos-Barrera, Arias-Merino, & Banuelos-Barrera, 2013; Chaplin, 2016; Driver et al., 2010; USDHHS, 2018). Secondly, many internal and external factors affect foot care and outcomes (Chin et al., 2012; Cuevas, Stuifbergen, Brown, & Rock, 2017; Doucette, Salas, Wang, & Scherrer, 2016; Herrera et al., 2011). Lastly, there are effective solutions available. Identifying barriers and facilitators while using a culturally competent, theory-based approach to educational interventions in diabetic foot care translates to improved outcomes (Cheng et al., 2017; Dorresteijn, Kriegsman, Assendelft, & Valk; 2014).

**Importance of Care**

Patients with diabetes have high rates of comorbidities such as depression, renal and heart disease, autonomic and peripheral neuropathy, sexual dysfunction, and blindness (ADA, 2018,
Standards of medical care; CDC, 2017). Hyperglycemia causes loss of sensation by nerve damage and inadequate blood flow to distal tissues (ADA, 2018, Standards of medical care; Boulton et al., 2008; Gemechu, Seemant, & Curley, 2013). Most patients are unaware of a peripheral neuropathy diagnosis although 50% are at risk of developing neuropathy (Banuelos-Barrera et al., 2013; Boulton et al., 2008; Guttormsen & Chadwick, 2017). Diabetic patients have a 15%-25% risk of developing a diabetic foot ulcer, which can lead to infection and amputation (Gemechu et al., 2013). Diabetic foot complications place a heavy economic burden on patients (Driver et al., 2010; Margolis et al., 2011). Diabetic foot ulcers require frequent medical visits and high utilization of resources (Day, 2014; Margolis et al., 2011). Diabetic ulcer-related amputations average two hospitalizations and cost $70,000 (Day, 2014).

Factors Affecting Foot Care

Internal influences affecting diabetic foot care include anxiety, depression, and cognitive level (Cheng et al., 2017, Chin et al., 2012; Cuevas et al., 2017; Pocuis et al., 2017). Patients are often not involved in their care plan, have inadequate social support, and lack the knowledge to care for their diabetes (Banuelos-Barrera et al., 2013; Bullen & Young, 2016; Cheng et al., 2017; McBride et al., 2016; Phillips, 2016; Pocuis et al., 2017). External factors such as insurance coverage, language, and health literacy impact diabetic foot care (Bullen & Young, 2016; Doucette et al., 2016; Herrera et al., 2011; Wolff et al., 2015). Diabetic foot exam, instruction, and education depend on healthcare personnel and willingness to maximize patient involvement in their care plan (ADA, 2018, Standards of medical care; Banuelos-Barrera et al., 2013; Simplicio De Oliveira et al., 2016; Solanki & Vig, 2016). The ADA, USDHHS, Society for Vascular Surgery, and International Working Group on the Diabetic Foot (IWGDF) promote minimal standards of care for diabetic foot exams yet rates continue to be lower than expected.
PATHWAYS TO ADEQUATE FOOT CARE

Education and diabetic foot exams are available and inexpensive for preventive care (ADA, 2018, Standards of medical care; USDHHS, 2018). Assessment for peripheral neuropathy at the diagnosis of type 2 diabetes, at least annually for identification of risk factors for ulcers and amputations, and inspection at every visit is recommended (ADA, 2018, Standards of medical care). Providers are encouraged to present self-foot care education to all patients with diabetes (ADA, 2018, Standards of medical care; Hingorani et al., 2016). The Healthy People 2020 goals call for an increase in annual diabetic foot exams performed to 74.8%, and formal diabetes education to 62.5% (USDHHS, 2018). Provider foot examinations should include pinprick and temperature sensation; vibration and 10-g monofilament; and patient inquiry of experiencing pain, burning, tingling, or numbness (ADA, 2018, Standards of medical care). Education should include information about the importance and instruction of performing a daily foot exam, nail and skin care, footwear, and foot deformities, for all patients with type 2 diabetes and their families (ADA, 2018, Standards of medical care).

Cognition levels, beliefs, and perceptions must be considered for education to be individualized and effective (Baba et al., 2015; Bullen & Young, 2016; Cheng et al., 2017; Chin et al., 2012; Dorresteijn et al., 2014; Phillips, 2016). Diabetic patients can suffer from cognitive dysfunction, which may affect their short-term memory and ability to perform daily self-foot exams (ADA, 2018, Standards of medical care; Cuevas et al., 2017). Perceived barriers alter rates of self-care and daily self-foot exams (Chin et al., 2012; Cuevas et al., 2017; Pocuis et al., 2017). Decreased rates of self-foot exams were associated with patient beliefs that foot exams
take too much time, are too much trouble, and are not important (Pocuis et al., 2017). Patients who reported higher rates of daily self-foot exams perceived fewer barriers (Pocuis et al., 2017). Self-efficacy and awareness of neuropathy diagnosis are associated with higher rates of daily self-foot exams (Chin et al., 2012).

Shared-decision making between providers and diabetic patients with active ulcers is effective (McBride et al., 2016; Phillips, 2016). There are many vehicles for providing diabetic education (Baba et al., 2015; Dorresteijn et al., 2014; Heinrich et al., 2012; Hope Kolltveit et al., 2017; Morey-Vargas & Smith, 2015; Morrow et al., 2013.) Interventions need to allow for patient individualization and flexibility depending on patient factors of health literacy, language proficiency, insurance status, and disability (ADA, 2018, Standards of medical care; Bullen & Young, 2016; Doucette et al., Herrera et al., 2011; Solanki & Vig, 2016; Wolff et al., 2015). Interventions that incorporate theory promote self-management and improve diabetes outcomes (Cheng et al., 2017; Flode et al., 2017). The majority of the evidence-based literature on diabetic foot education is not generalizable (Dorresteijn et al., 2014). Written delivery of patient education and interactive education is associated with improved attitudes and understanding of preventive measures (Baba et al., 2015).

Theory

Interventions developed with theoretical principles result in improved outcomes (Chin et al., 2012; Stock et al., 2014). Incorporating theory-based elements in diabetic educational interventions positively affects rates of patient education and decreases perceived barriers to self-care (Chin et al., 2012; Stock et al., 2014). Chronic Care Model (see Appendix E) concepts of self-management and decision support were associated with patient-centered, high quality, and collaborative diabetes care (Stock et al., 2014).
Guidelines in the treatment and care of diabetes from the ADA support the concept of theory-based diabetes care (ADA, 2018, Standards of medical care). The 2018 ADA Standards of Medical Care promote the use of the Chronic Care Model, which includes six core elements to guide care and treatment plans: delivery system design, self-management support, decision support, clinical information systems, community resources and policies, and health systems (ADA, 2018, Standards of medical care). Elements of the Chronic Care Model integrated into the evidence-based project educational intervention include self-management, decision support, delivery system design, and community resources and policies (see Appendix E; ADA, 2018, standards of medical care).

Methods

IRB/Site Approval

A site agreement was secured with a Midwest outpatient medical practice. The project was determined to be Not Human Subjects Research by the University of Missouri Kansas City Institutional Review Board (see Appendix F).

Ethical Issues

Risks to privacy were minimized by removing identifiers from patient data. Results were recorded and analyzed by number assignment. Participation was voluntary. Cultural and ethnic considerations in the project design accommodated for patients of all race, gender, cultures, socio-economic, and educational backgrounds (Im, 2015; Kao, Hsu, & Clark, 2004; Knobf et al., 2007). The literacy level of the education and survey was at a Fifth-grade level (Knobf et al., 2004).

Funding
The student investigator was given ten dollar discount retail gift cards for enrollment incentives from UMKC faculty Research Incentive Funds. Additional funding was at the student investigator’s expense. Costs totaled $1993.93 (see Appendix B). Gift card costs for patients and staff were included.

Setting and Participants

A privately owned physician practice was the site for the project. No satellite offices were included. The practice is located in a large metropolitan city, housed in a medical office building on a health system campus in The Midwest. A convenience sampling with a goal of 105 type 2 diabetic patients over the age of 50 was utilized. Patient appointments occurred between November 1, 2018, and February 28, 2019 (see Appendix G). Patients were diagnosed with type 2 diabetes before November 1, 2018. Exclusion criteria applied to patients aged 50 or younger and patients without a diagnosis of type 2 diabetes.

EBP Intervention

The project intervention began with weekly scheduled reviews (see Appendix H). Each patient on the EMR-generated schedule was reviewed for inclusion criteria of age and a diagnosis of type 2 diabetes by the investigator. Weekly rosters with identified potential patients, as well as enrollment totals, were emailed by the investigator to office staff and providers. Schedules with patient letters (see Appendix I), foot care surveys, and foot education (see Appendix J) packets were given to front desk staff weekly.

On the day of the potential participant appointment, the individual was given brief information about the project by the front desk and/or office nurse and asked if they would like to participate. After the patient agreed to voluntarily participate, they were given the project packet. Each project packet included an introductory letter, foot care survey based on the
Diabetic Foot Ulcer Health Belief Scale (DFUHBS), educational materials, a clip board, a writing utensil, and a gift card valuing $10. The adapted survey consisted of demographic questions, two frequency of self-foot exam questions, seven barriers to self-foot exam questions, and two comprehension questions (Chin et al., 2012; Pocuis et al., 2017). It was a one-sided, one-page questionnaire written at a Fifth-grade literacy level.

After the survey tool was completed, the patient read the one page, one-sided self-foot exam information. Self-foot exam principles were written based on the American Diabetes’ Association 2018 Standards of Care with a literacy level of Fifth grade (ADA, 2018, Standards of medical care). The evidence-based educational tool included a picture of feet, principles of performing self-foot exams, and information on the importance of performing foot exams (ADA, 2018, Standards of medical care). Instructions for patient daily self-foot exams stressed the ease and quickness of performing daily foot exams (ADA, 2018, Standards of medical care).

When the patient was brought to the exam room, the adult was given the opportunity to review the foot survey and self-foot exam education piece. Providers were allowed the opportunity to discover barriers to self-foot exams during the visit. Patients were granted the opportunity for additional education and time with the provider to ask questions, clarify concepts of daily self-foot exams, provide teach back, and formulate a shared plan of care. At the end of the appointment, clinic staff offered the patient the educational tool to take home. The survey was returned to the student investigator. All surveys were stored and reviewed weekly by the student investigator. Patients were enrolled from November 2018 through February 2019.

Telephonic follow-up was conducted by the investigator at least two weeks after the patient’s office visit and commenced on March 8, 2019. Patients who responded yes to the question Do you check your feet every day were asked if they were still checking their feet every
day. Patients who responded *no* were asked if they checked their feet every day and frequency of self-foot exams. All patients were offered education on diabetic self-foot exams and the opportunity to ask additional questions.

De-identified data were entered into the Redcap database, which is a secure program, and SPSS. Updates of project enrollment and results were provided to the project site staff through email and in-person communication through April 2019. Training deficiencies, questions, concerns, project feedback, and suggestions for future projects continued through April 2019.

Preparatory meetings with practice staff months before project initiation was important for establishing a sense of urgency and creating a shared vision and purpose (Kotter, 1995). It was essential to disseminate statistics of diabetes in Missouri and project background information with staff for a smooth transition during a change to practice (Kotter, 1995). Training for enrollment and intervention continued regularly (see Appendix G).

**Change Process and EBP Model**

Successful implementation of the evidence-based project required the use of validated approaches from the Kotter and Cohen Model of Change (Kotter, 1995). Identifying key leaders in the project site office as well as staff involvement was important for generating an organizational sense of urgency and buy-in (Kotter, 1995). The project success relied on the expertise of involved providers and both quantitative and qualitative studies which conveyed that interventions are not only based on recommended guidelines but also supported by patients’ beliefs and attitudes (Rosswurm & Larrabee, 1999). Sustainability likelihood was strengthened through weekly communication and regular meetings with office staff and stakeholders. Project costs were low, and a sense of urgency, buy-in, and vision throughout the staff will support long-term sustainability for future patients and projects.
Study Design

The study design was quasi-experimental without a control group. Convenience sampling was utilized with a goal of recruiting 105 patients. This evidence-based project used a single group design with pre- and post-intervention evaluation. Patients with type 2 diabetes over the age of 50 were given an interactive intervention that included a survey, educational tool, and questions before and after the intervention. The study design chosen was the most appropriate to evaluate the effect of interactive education on the frequency of daily self-foot exams while examining perceived barriers to self-foot exams (see Appendix K).

Validity

A strong association between the independent variable of educational intervention and the dependent variable of number of diabetic self-foot exams would support internal validity although not account for confounding factors on internal validity. To promote internal validity, the educational tool was designed using evidence-based literature (Chin et al., 2012; Pocuis et al., 2017). The student investigator communicated with office staff regularly and frequently for consistency and buy-in of project implementation. The student investigator completed all follow-up. A large sample of 106 patients strengthened internal validity and generalizability. Study participants from all races, ethnicity, and socio-economic backgrounds were recruited for a diverse sample representative of the diabetic population which strengthened external validity (MDHSS, 2017).

Measured Outcomes

Two outcomes were sought. The primary outcome measured for an association between interactive patient education in an outpatient medical office setting and frequency of daily self-foot exams in type 2 diabetic patients. A secondary outcome included gathering patient-
perceived barriers to assess for patterns which may inhibit daily self-foot exams (see Appendix L).

**Measurement Instruments**

Many behavioral and knowledge assessment tools for diabetes are published, but few tools specifically address diabetic self-foot exams (Dorresteijn et al., 2014). Measured outcomes of frequency and perceived barriers of self-foot exam were explored by The Chin et al. group in Taiwan through the development of their Diabetic Foot Ulcer Health Belief Scale (DFUHBS; 2012). Demographic data of gender, age, and educational level were collected in addition to the frequency of exams and perceived barriers (Chin et al., 2012). The student investigator received permission (see Appendix M) to use the adapted English version of the DFUHBS used in the Pocuis et al. study (2017). The original DFUHBS created by Chin et al. (2012) has a content validity index of 0.94 for perceived barriers (Chin et al., 2012, p. 63). Cronbach’s α was 0.80 (Chin et al., 2012, p. 63). A certified diabetes educator/family nurse practitioner reviewed the adapted DFUHBS for content validity (Pocuis et al., 2017, p. 85).

**Quality of Data**

Measuring the number of diabetic daily self-foot exams by a self-reported question and answer through telephone and in writing has been reported in the literature (Chin et al., 2012; Pocuis et al., 2017). To assess perceived barriers to the daily self-foot exam, a Health Belief Model questionnaire specific to diabetic foot care designed by Yen-Fan Chin and later adapted and translated from Taiwanese to English by a University of Washington research group was used in the project (Chin et al., 2012; Pocuis et al., 2017). Both the original and adapted DFUHBS surveys are validated tools which contributed to data quality (Chin et al., 2012; Pocuis et al., 2017).
Project data collected was compared to the literature including data from the Taiwanese and Washington groups for benchmarking. A priori power analysis calculated power .80, probability of 0.05 and anticipated effect size of 0.5 for a sample size of 105.

Analysis Plan

Data was collected from patient surveys and telephone follow-up then entered into the Redcap database and SPSS version 25 for analysis. A McNemar test was used to compare frequency of self-foot exams before and after interactive education. Analysis of one independent variable of interactive patient education and the dependent variable of number of foot exams, which is measured as yes for performs daily self-foot exams or no for does not perform daily self-foot exams, and considered dichotomous, requires the use of a McNemar test. A one-tailed test was used as the same group was compared before and after the intervention.

A Spearman Rho was used to evaluate for an association between exam performance and age, gender, education level, and rank of perceived barriers to completing foot exams. Education and survey understanding were also analyzed. A statistical level (p<.05) was considered significant.

Results

Setting and Participants

The project was implemented at a private physician-owned medical practice in a large Midwestern city serving nephrology and internal medicine patients. One hundred and six patients were enrolled between November of 2018 and February of 2019. One of the 106 patients dropped out of the study and had to be excluded. All patients were over the age of 50 and had been previously diagnosed with type 2 diabetes. Participants ranged in age from 51 to 99 years. The most frequently reported ages were 70-79 (38.3%) followed by 60-69 and 80-89 (both
21.5%), and female (52.4%) to male (47.6%) patients were comparable. Most patients had graduated from high school (90.6%). Sixty-two percent of the respondents reported some college or more. The educational intervention was carried out at the same outpatient clinic; no satellite offices were used. Enrollment commenced on February 20, 2019 and the final telephone follow-up call was made on March 8, 2019.

**Intervention Course**

Weekly schedule reviews were initiated the first week of November after administrative access was granted in the EMR. Each patient on the schedule was screened for age and existing diagnosis of type 2 diabetes by the investigator. Project introductory letters, foot care surveys, and self-exam education were copied by the investigator and collated into packets that were placed at the front desk weekly after schedules were emailed to the office staff.

Potential patients were offered voluntary enrollment when checking in for their appointments. Enrollment was initially robust with 13 patients in week one. As the weeks ensued, enrollment continued then slowed by weeks 10 and 11 possibly due to staff fatigue. To incentivize staff involvement, a drawing for two discount retail gift cards was offered for every patient enrolled. An increase in enrollment followed with 11 patients enrolled in week 14. The target sample of 105 patients was achieved by the end of week 16. Patients were enrolled from November 2018 through February 2019.

Telephonic post education follow-up was done solely by the investigator to strengthen internal validity. Patients were called at various times of the day and days of the week to maximize follow-up completion. Multiple phone call attempts were made however 28 of 105 or 26% of patients could not be contacted for post-intervention questioning. Follow-up phone calls were conducted until March 8, 2019.
Staff were inquisitive and helpful throughout the project. Many providers as well as office staff asked about enrollment and follow-up results. One staff member offered to collect data and two staff members offered to do telephonic follow-up, but all offers were declined to protect the validity of the project.

**Outcome Data**

There were 105 patients included in data analysis for the project. None of the demographic variables, age, gender, or education level, had a statistically significant association with daily self-foot exam frequency. Pre-intervention there were 73 or 68.9% who reported checking their feet every day. Conversely, there were 33 or 31.1% of patients who reported they did not check their feet every day. When asked in a second frequency question *when do you check your feet*, participants reported every day (78.6%) followed by once a month (19.0%).

There were 74 matched pairs of pre- and post-exam responses. There were 7 of 33 patients or 21.1% who initially reported not checking their feet every day who improved and stated they did check their feet every day post-intervention. A McNemar test to compare pre- and post-intervention pairs showed a significant difference (*p* = .035) in the patients who answered *no* to *Do you check your feet every day* before interactive education then changed their answer and reported *yes* after the intervention (see Appendix N).

Perceived barriers to performing foot exams were asked on initial visits by written surveys. The perceived barriers ranked highest for patients were *I do not check my feet every day because it is too much trouble* (*p* = .000), *I am too busy to check my feet every day*, (*p* = .001), and *I forget to check my feet every day*, (*p* = .021). Perceived barriers were ranked lowest by participants who felt *I cannot check my feet every day because I cannot find someone to help me,*
Among patients reporting daily self-foot exams, all perceived barriers were ranked lower. Patients were asked if they understood the survey and education piece although these questions were not outcomes of the project. Ninety-four percent of participants reported understanding questions on the written survey with one missing entry. Patients reported understanding the self-foot education piece at a rate of 97% with six missing data entries. The majority or 71.7% of the participants who stated performing daily self-foot exams reported they were able to understand the questions and survey \( (p = .047) \). Patients who indicated performing daily self-foot exams reported they were able to understand the foot care education page \( (p = .144) \).

Missing data skewed almost all categories of project data. Patients left written survey fields empty in the age, gender, perceived barriers, understanding of survey, understanding of education, and post-intervention exam frequency questions. There were 28 of 105 patients lost to follow up during telephone calls which also contributed to missing data.

**Discussion**

**Successes**

The most important successes of the project included the number of participants in the study sample (105), a significant increase of daily self-foot exams pre- to post-intervention \( (p = .035) \), an account of perceived barriers to self-foot exams, and an assessment of participant levels of understanding of the written survey and foot care education. There were 7 of 33 patients who first reported not doing daily self-foot exams that after the educational intervention reported performing daily self-foot exams. Important insight was gleaned regarding perceived barriers among all patients. Daily self-foot exams were perceived by patients as too much trouble,
patients felt they are too busy, patients forgot to check feet daily, patients felt they have more important things to do, and patients felt embarrassed to find someone to help them. The majority of patients understood the written survey questions and foot education which were both written at a Fifth-grade level and based on ADA guidelines and a validated self-foot exam survey.

**Study Strengths**

The elements of the project setting that contributed to study strengths included supportive administration and physicians, and flexible and interested office staff. Most staff demonstrated buy-in, frequent inquiries regarding results and implementation, and a readiness to enroll patients. Pre-intervention surveys were anonymously filled out which contributed to a 100% in-office survey return rate. Staff training was able to be accomplished on a regular and frequent basis for internal validity of results. All telephonic post-intervention follow up was done by the investigator. Having one person conducting follow up contributed to internal validity as well. Using telephonic follow up instead of mailed surveys provided for a large amount of data collected post-intervention. The survey tool was brief, one-sided, one-page, and based on validated tools (Chin et al., 2012; Pocuis et al., 2017).

**Results Compared to Evidence in the Literature**

Frequency of self-foot exams in this project does not correlate with evidence from the literature. There are few studies reporting rates of patient-performed diabetic foot exams. Of the scant reported data, the literature shows only a 23.5-29.5% rate of daily diabetic self-foot exams from published studies (Chin et al., 2012; Pocuis et al., 2017). Patients in this project reported completing daily self-foot exams pre-intervention at a rate of 68.9%.

There were no identified published studies for exact comparison to this project. No projects or studies measured the frequency of daily self-foot exams before and after an
interactive educational intervention. One study evaluated perceived barriers and the effect of provider-performed foot exam rates on self-foot exam rates (Pocuis et al., 2017). Pocuis et al. (2017) and Chin et al. (2012) studies both found fewer reported perceived barriers to daily self-foot exams which was consistent with the findings of the current project. The impact of the level of education of at least a high school education was consistent with the Pocuis et al. study (2017). This current project did not assess for rates of provider-performed exams, number of clinic visits a year, or level of HgbA1C as was performed in the Pocuis et al. group (2017).

A study performed at two hospitals in northern Taiwan measured perceived barriers to daily self-foot exams. Patient criteria included a diagnosis of diabetes, age of at least 20 years old, and a known diagnosis of peripheral neuropathy (Chin et al., 2012). The Chin et al. study did not include an educational intervention (2012). Health behaviors and family support were also assessed as predictors of rates of self-foot exams (Chin et al., 2012).

Patients have previously reported perceived barriers to exams which include that they are too busy, foot exams are perceived as being too much trouble, and foot exams are perceived as not being important (Chin et al., 2012; Pocuis et al., 2017). Findings were similar to this project as participants reported the most influential daily exam barriers of being seen as too much trouble, being too busy, forgetting, having more important things to do, and being embarrassed to ask for help. A younger age was found to be associated with higher rates of daily self-foot exams in the literature but was not consistent with findings in this current project (Chin et al., 2012).

Limitations

Internal Validity Effects

Internal validity could have been jeopardized by having several staff members participate in enrollment and implementation. Staff members could have influenced patient answers.
Providers seeing the patient could have impacted patient survey responses. Internal validity could have been jeopardized due to a difference in pre- and post-intervention survey completion using different modalities. Pre-education surveys were performed in writing while post-education follow up was done by telephone. The investigator had an inherent bias for daily self-foot exams.

**External Validity Effects**

The project site was a Midwest outpatient medical office. The practice sees a large number of patients with chronic kidney disease which could be a deviation from other outpatient medical offices. Generalization could be compromised as the patients may have a higher rate of diabetes, be more aware of their diabetes, and have a higher tendency to have received diabetic education in the past. The mean age for project participants was 73 years old. Comparable studies in recent literature reported a younger age mean of 51.1 and 66.8 years (Pocuis et al., 2017; Chin et al., 2012, respectively). This project did not assess for variables of HgbA1C level, annual household income, ethnicity, diagnosis of neuropathy, duration of diabetes diagnosis, or rate of provider-performed diabetic exams to strengthen or refute previous research.

**Sustainability of Effects**

Office staff displayed enrollment fatigue by week 10 which could have negatively affected project sustainability. Enrollment incentives such as gift cards for staff could have affected patient selection, enrollment, and sample size. Enrollment fatigue could be minimized if daily self-foot exam frequency and perceived barrier questions were embedded into the EMR as routine visit inquiries and part of quality assurance.

Of patients not performing self-foot exams, 21% stated they checked their feet more often after their visit and education. Sustaining enthusiasm for self-foot education over time could be
enhanced by posting written information, having written information readily available to take home with patients, and associating assessment of self-foot exams with financial incentives for staff and providers. Prevention of foot infections and amputations could be positively impacted by repeat foot education over multiple visits.

**Efforts to Minimize Limitations**

Using a telephonic method for follow-up post education was intentionally done to allow for the collection of more data. Mailed surveys traditionally have low response rates. The investigator intentionally allowed for a compromise of internal validity for additional data gains. Missing data was potentially decreased.

The investigator further attempted to minimize limitations to internal validity by doing all telephonic follow-up by one person. This method helped to ensure internal validity by minimizing staff bias and variability during follow-up calls. This was done at the expense of potential investigator bias. All weekly schedule reviews were also done by the investigator to minimize variability between staff processes. Decreasing project process variability should strengthen post-education follow-up survey results.

**Interpretation**

**Expected and Actual Outcomes**

Pre-intervention diabetic self-foot exam frequency reported in this project were not expected. There are few current studies in the literature. However, the self-foot exam has been reported to be as low as 23.5% to 29.5% by national and international research groups (Chin et al., 2013; Pocuis et al., 2017). Reports of daily self-foot exam frequency were 68.9% pre-intervention and 79.7% post-intervention in this Midwest outpatient medical office. The number
of patients who answered no to performing daily self-foot exams pre-intervention then changed to yes on post-intervention follow-up was significant ($p = .035$).

Results for perceived barriers to daily self-foot exams were different compared to recent reports in the literature. In recent literature patients previously reported that the most common perceived barriers were that daily self-foot exams take too much time, are too much trouble, and are not seen as important (Chin et al., 2013; Pocuis et al., 2017). There is not a robust amount of data in the literature on this subject. The Chin et al. group created the DFUHBS tool as there was not one to address perceived barriers in existence (Chin et al., 2012). Patients in this current project reported the most common perceived barriers were that daily self-foot exams were seen as too much trouble, patients were too busy, and patients forget to check their feet daily.

**Intervention Effectiveness**

The interactive educational intervention was associated with a significant increase in frequency of performing daily self-foot exams. Future or long-term results are difficult to assess based on one-time follow-up phone calls and patients lost to follow-up. Patients who were lost to follow-up could have negatively or positively affected the desired outcome. Future projects could include more aggressive follow-up, utilizing both phone and mailed surveys, and using additional staff for more outcome data.

Intervention effectiveness is difficult to ascertain regarding the number of patients who reported already performing daily self-foot exams, which was impressive yet unexpected at over 68%. Patients who were not performing self-foot exams occurred at an unexpectedly low rate of 31%. A difference in project setting, process, or staff could have affected the rate at which self-foot exams were reported.
Future interventions would most likely be effective in an outpatient medical office setting. Few studies have been done recently exploring diabetic self-foot examination. However, one study reported in the literature was done in an outpatient medical office, which provides ongoing access to patients pre- and post-interventions (Pocuis et al., 2017). Further, offices who have staff and physician buy-in and project champions have the potential for increased project success including patient enrollment and implementation efficacy (Kotter, 1995).

**Intervention Revision**

Intervention modifications to improve outcomes include an increased patient sample size, longer enrollment period, increased gift card incentives, increased allotment of time for the interactive education, and the utilization of patients from additional outpatient office sites. An increase in sample size could promote generalizability. Survey questionnaires and responses could be integrated into the EMR. Increasing the patient sample size could strengthen the power of results and add to the body of evidence for diabetic self-foot exams. Additional variables could be added to the surveys including HgbA1C level, duration of diabetes diagnosis, diagnosis of peripheral neuropathy, assessment of self-efficacy, rate of provider-performed diabetic foot exams, and questioning whether or not a patient had received prior diabetic education.

Patients have been recruited for international as well as national locations in a limited number of previous studies (Chin et al., 2013; Pocuis et al., 2017). Recruiting from additional locations would strengthen the generalizability of findings. Recruiting patients from more outpatient medical offices in the Midwest would also strengthen the results of this study for comparison and contrast. Future diabetic self-foot exam studies could explore the potential of additional perceived barriers not yet reported for a more comprehensive understanding of patient insight. Patients could be given a write in option if perceived barriers do not include their
thoughts or feelings. There are many factors that have the potential to affect diabetes care which need to be explored in more depth as potential perceived barriers for self-foot exams (Cheng et al., 2017, Chin et al., 2012; Cuevas et al., 2017; Pocuis et al., 2017). Interventions that are web-based and completely anonymous could decrease patient fears of reporting and allow for additional perceived barriers to be reported without perceived judgement.

**Expected and Actual Impact to Health**

Interactive self-foot exam education is expected to increase the awareness and frequency of properly performed diabetic self-foot exams. An increase in self-foot exams allows patients and care givers an earlier opportunity to detect and treat disease while avoiding costly complications. Exploring perceived barriers most commonly reported allows for solutions to be sought, integrated into educational material, and presented to patients. Individual care plans can be tailored according to barriers while allowing for self-foot exams to be performed quickly, easily, and consistently.

**System, Costs, and Policy**

Self-foot exams are expected to increase awareness of disease and prevent costly complications. National guidelines promote self-foot exams, but education and exams are not being done consistently according to the literature. There are no national objectives or current incentives tied to self-foot exam frequency. Future initiatives to more aggressively incentivize providers to educate patients about diabetes and self-foot care should be proposed and implemented for improved outcomes. Each provider, state, and health system should also be held accountable with public reporting for self-foot exam frequency. Increased self-foot exams should lead to more foot care awareness, fewer hospitalizations and amputations, and thousands of dollars of decreased costs to the health care system overall.
Costs of the project were estimated to be over $2200.00 for 105 patients in an outpatient setting. After implementation with 106 patients, project costs were under budget totaling $1993.93. This cost is a fraction of the cost of an amputation and hospital-associated costs of diabetic foot disease (Day, 2014; Margolis et al., 2011). Costs of implementing this project in outpatient medical offices and preventing diabetic associated foot complications far outweigh the potentially high costs to healthcare systems and patient quality of life.

**Further Opportunities**

Further opportunities for diabetic self-foot exam projects are easily attainable with demonstrated low cost to benefit ratios, little time commitment from practices and staff, and low existing reported rates of diabetic education and self-foot exams being performed. Patients should be asked about self-foot exams at every visit. Inquiries should be embedded into EMRs and reported as mandatory incentive-based outcomes. Patient-perceived barriers could be further explored and applied to education to provide solutions for each individual.

**Conclusions**

The increase of people affected by diabetes, costs of less than adequate care, and sustained effects on society are unacceptable (ADA, 2018, Standards of medical care; Chaplin, 2016; Driver et al., 2010; USDHHS, 2018). Patients are subject to many comorbidities from diabetes, but preventive measures are available to lessen the costs of progressive medical, psychological, and social burdens (ADA, 2018, Standards of medical care; USDHHS, 2018). Complications can be prevented through the use of evidence-based, theory supported interventions for type 2 diabetic patients (Chin et al., 2012; Pocuis et al., 2017).

**Practical Usefulness of Intervention**
The intervention in this evidence-based project has practical usefulness that allows low-cost implementation requiring minimal follow-up and change to practice that is encouraged by the ADA and USDHHS (ADA, 2018, Standards of medical care; USDHHS, 2018). Change to practice requires consistent education and buy-in from providers and staff to succeed (Garza, Dols, & Gillespie, 2017; Kotter, 1995). Effective interventions need to include individualization for patients accounting for internal and external factors that affect success or failure in diabetes care (Bullen & Young, 2016; Cuevas et al., 2017; McBride et al., 2016; Phillips, 2016).

**Further Study**

This evidence-based project utilizes interactive education of diabetic self-foot exams not reported extensively in the literature (ADA, 2018, Standards of medical care; Dorresteijn et al., 2014). Education includes standardized definitions of foot care and education from the ADA allowing for complex care in a universal language (ADA, 2018, Standards of medical care). Outpatient medical clinics can easily implement this cost-effective evidence-based project to enhance standardized benchmark data and further the understanding of barriers to diabetic daily self-foot exams.

**Dissemination**

Dissemination plans include poster presentations at the Advanced Practice Nurses of the Ozarks (APNO) conferences in November 2018 and 2019, local American Nephrology Nurses’ Association 2019 meeting, and submission of manuscript to the American Association of Nurse Practitioners publication *The Journal of the American Association of Nurse Practitioners*.

Diabetic foot care is often inadequate and expensive. Patients have many barriers to self-care which promotes health and self-actualization. Providers need to utilize interventions
supported by current evidence-based literature and guidelines to promote self-care which ultimately benefits patients, their families, and society.
References


http://library.armstrong.edu/eres/docs/eres/NURS4445-1_TAGGART/444502tagModelforChange.pdf


Appendix A, Definition of Terms

Diabetic education: specific education provided by diabetic educators, nurses, or providers including self-monitoring blood glucose, nutrition, and preventive care applicable for diabetic patients; foot care education should include more specific information regarding risk factors, daily home self-foot exam, nail care, and footwear (ADA, 2018, Standards of medical care).

Diabetic Foot Ulcer Health Belief Scale (DFUHBS): a tool developed by Chin et al., to measure patient beliefs and perceptions about performing daily self-foot exams (Chin et al., 2012).

Self-foot exam: patients with diabetes are strongly encouraged to perform daily self-foot exam that includes physical assessment of feet including skin, structure, temperature, sensation, presence of wounds or sores, and pulses (ADA, 2018, Standards of medical care).
Appendix B, Cost Table for Project

<table>
<thead>
<tr>
<th>Line Item</th>
<th>Costs</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary - Jennifer Branch/Student investigator</td>
<td>$0.00</td>
<td>Student investigator home time, work allowed time</td>
</tr>
<tr>
<td>Salary - Staff training, implementation time</td>
<td>$0.00</td>
<td>3 medical assistants, 2 LPNs, 3 front desk staff – education and training in regularly scheduled staff meetings, additional training each 1-2 minutes per occurrence, work allowed time</td>
</tr>
<tr>
<td>Supplies</td>
<td>$155.26</td>
<td>Introduction letter, Education tool, Foot Care Survey copies, paper, ink</td>
</tr>
<tr>
<td>Gift Cards</td>
<td>$380.00</td>
<td>Wal-Mart gift cards – given by UMKC faculty as part of Research Incentive Funds</td>
</tr>
<tr>
<td>Gift Cards</td>
<td>$750.00</td>
<td>Target gift cards – purchased by student investigator</td>
</tr>
<tr>
<td>Travel</td>
<td>$150.00</td>
<td>Regional Conference fee with poster presentation</td>
</tr>
<tr>
<td></td>
<td>$397.00</td>
<td>Hotel accommodations</td>
</tr>
<tr>
<td></td>
<td>$63.00</td>
<td>Gas $2.25 gallon/191 miles</td>
</tr>
<tr>
<td>Presentation materials</td>
<td>$98.67</td>
<td>Poster</td>
</tr>
<tr>
<td>Total</td>
<td>$1993.93</td>
<td></td>
</tr>
</tbody>
</table>
### Rating System for the Hierarchy of Evidence

**For an Interventional Inquiry**

(Modification by Dr. Lindholm for course N5613)

<table>
<thead>
<tr>
<th>Level</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong></td>
<td>Evidence from a systematic review or meta-analysis of all relevant RCTs. <em>Evidence-based clinical practice guidelines based on systematic reviews of RCTs).</em></td>
</tr>
<tr>
<td><strong>II</strong></td>
<td>Evidence obtained from well-designed RCT.</td>
</tr>
<tr>
<td></td>
<td><em>Quantitative systematic review of well-designed controlled trial without randomization.</em></td>
</tr>
<tr>
<td><strong>III</strong></td>
<td>Evidence obtained from well-designed controlled trial without randomization <em>(quasi-experimental).</em></td>
</tr>
<tr>
<td></td>
<td><em>Quantitative systematic review of case-control, cohort, or correlational studies.</em></td>
</tr>
<tr>
<td><strong>IV</strong></td>
<td>Evidence from well-designed case-control or cohort study <em>(or cross-sectional study)</em></td>
</tr>
<tr>
<td><strong>V</strong></td>
<td>Evidence from systematic review of <em>quantitative descriptive (no relationships to examine)</em> or qualitative studies.</td>
</tr>
<tr>
<td>Level</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
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</tr>
<tr>
<td>VI</td>
<td>Evidence from a single <em>quantitative descriptive</em> (no relationships to examine in the study) or qualitative study</td>
</tr>
<tr>
<td>VII</td>
<td>Evidence from the opinion of authorities and/or reports of expert committees</td>
</tr>
</tbody>
</table>

(Melnyk & Overholt, 2015, adapted)
<table>
<thead>
<tr>
<th>First author, Year, Title, Journal</th>
<th>Purpose</th>
<th>Research Design(^1), Evidence Level(^2) &amp; Variables</th>
<th>Sample &amp; Sampling, Setting</th>
<th>Measures &amp; Reliability (if reported)</th>
<th>Results &amp; Analysis Used</th>
<th>Limitations &amp; Usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paths to Improved Foot Care</strong></td>
<td>Explore effect of self-management interventions with glycemic control, diabetes knowledge, and behavioral outcomes.</td>
<td>Meta-analysis of randomized controlled trials, level 1. Variables: interactive self-management interventions, behavioral change techniques, HgbA1C, diabetes knowledge, self-efficacy, diabetes-related distress, quality of life.</td>
<td>16 trials with 3,545 participants with poorly controlled type 2 diabetes, randomized.</td>
<td>Hgb A1C, The nutrition knowledge questionnaire, Diabetes Knowledge Test, Diabetes Self-efficacy scale, Stanford Chronic Self-efficacy scale, the Problem Areas in Diabetes Questionnaire, and Diabetes Distress Scale.</td>
<td>Reduction in HgbA1C (MD: -0.43%, 95% CI: -0.67% to -0.18%, p&lt;.001), knowledge improvement (SMD: 0.30, 95% CI: 0.03 to 0.58, p = .03), potential benefit in self-efficacy (SMD: 0.29, 95% CI: 0.14 to 0.44, p &lt; .001), beneficial effect on diabetes-related distress (SMD: -0.21, 95% CI: -0.39 to -0.04, p = .02)</td>
<td>(+)mean age of participants 51-64 (+)interactive interventions improved outcomes (+)theory supported interactive interventions supported with theory (+)high level of evidence to support project intervention</td>
</tr>
<tr>
<td>Study</td>
<td>Objective</td>
<td>Methodology</td>
<td>Sample Size</td>
<td>Data Collection</td>
<td>Data Analysis</td>
<td>Results</td>
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<tr>
<td>-------</td>
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</tr>
<tr>
<td>Cuevas (2017).</td>
<td>Thinking about cognitive function Perceptions of cognitive changes in people with Type 2 diabetes. The Diabetes Educator.</td>
<td>Qualitative descriptive study, Level 5. Variables of cognitive function, beliefs.</td>
<td>10 patients with type 2 diabetes, aged 40-70 years, purposive sampling, a multisite endocrinology clinic in central Texas.</td>
<td>Perceived Deficits Questionnaire for study inclusion, narrative interviews.</td>
<td>Qualitative content analysis; a second reviewer coded the transcripts with level of agreement between the coders of 88%.</td>
<td>“Most” participants reported that cognitive problems had some impact on their diabetes self-management; most common theme was the desire for knowledge about potential effects of diabetes on cognitive function; (+)include in intervention tool (+)U.S. study with patients aged 40-70.</td>
</tr>
<tr>
<td>Doucette (2017).</td>
<td>Determine relationship of insurance coverage and foot exam, education</td>
<td>Case control study, Level 5. Variables insurance coverage, foot</td>
<td>8305 diabetic patients, aged 18-64 years old, from the core component of the Self-reported telephone interview</td>
<td>Patients with private insurance (OR = 1.72, 95% CI: 1.32-2.25) and (+)large sample size (+)diabetic indicators</td>
<td>(-)low level of evidence (-)results unclear – reported as “most,” “some,” or “others” (-)sampling excluded patients with any comorbid conditions that could affect cognition including depression (+)include in intervention tool (+)U.S. study with patients aged 40-70.</td>
<td></td>
</tr>
<tr>
<td>quality indicators among patients with diabetes in the US general population. Primary Care Diabetes.</td>
<td>exam, diabetic education.</td>
<td>2013 Behavioral Risk Factor Surveillance System (BRFSS), with no insurance, Medicaid, or private insurance, in 26 states in the U.S.</td>
<td>Medicaid (OR = 1.64, 95% CI: 1.23-2.18) were more likely than the uninsured to have a foot exam in the last year. Patients with private insurance were more likely than the uninsured to have diabetes education (OR = 1.36, 95% CI: 1.06-1.74); logistic regression, complex survey methodology procedures in SAS v9.4, Chi-squared, bivariate then multivariate logistic regression models.</td>
<td>(-)Medicare patients excluded (-)self-reported</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| Flode (2017). Lasting impact of an implemented self-management program on diabetes | Determine effect of self-management program on diabetes | Cohort study, Level 4. Variables Diabetes Self-Management | 115 patients with type 2 diabetes, non-selected, Norway. | Diabetes Knowledge Test, Patient Activation Measure, Mean knowledge improved from baseline (p&lt;0.001) and (-)Norwegian study (-)low patient retention (-)group setting |
| Garza (2017). An initiative to improve primary prevention of cardiovascular disease in adults with type II diabetes based on the ACC/AHA (2013) and ADA (2016) guidelines. | Determine effect of interactive education, electronic medical charting, and QI on provider adherence to guidelines. | Quality improvement project, cohort study, Level 4. Variables adherence to clinical guidelines, interactive clinic staff education, EMR assessment of ASCVD and diet and exercise counseling. | Chi-square ASCVD risk assessment ($X^2$ (1, 159) = 93.46), Chi-square documentation diet and exercise counseling ($X^2$ (1, 159) = 21.60), Chi-square statin therapy ($X^2$ (1, 159) = 33.80). | ASCVD risk assessment increased from 0% to 76.7% (p&lt;.001), diet and exercise documentation increased from 85% to 100% (p&lt;.001), statin therapy increased from 55% to 72.2% for applicable subjects. | (+)DSME principles for intervention; (+)mean age of subjects 54 years |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Title</th>
<th>Design</th>
<th>Participants</th>
<th>Methods</th>
<th>Results/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hope Kolltveit (2017). Bio Med Central.</td>
<td>Explore factors affecting telemedicine provided diabetic foot care</td>
<td>Qualitative, quasi-experimental, Level 5. Variables setting/location for foot ulcer follow up, frequency of follow up.</td>
<td>34 healthcare professionals from various settings, purposive sampling, Norwegian primary care clinic, general practitioners office, home-based, etc.</td>
<td>10 focus group interviews</td>
<td>Themes were identified from health professional focus group interviews; Interpretive description</td>
</tr>
<tr>
<td>McBride (2016). Increasing patient</td>
<td>Determine effect of patient involvement on foot ulcer,</td>
<td>Randomized controlled trial, Level 2. Variables</td>
<td>Patient Newly diagnosed with diabetic foot ulcer, age ≥16</td>
<td>7 item self-report questionnaire, European</td>
<td>No statistical significance was found between intervention and</td>
</tr>
</tbody>
</table>
| Baba (2014). A comparison of two methods of foot health education: The Fremantle Diabetes Study Phase II. Primary Care Diabetes. | Determine effect of written and interactive education on foot health and patient behavior. | Quasi experimental study, Level 4. Variables written education, interactive education, Foot Score, patient attitudes. | 154 community-based type II diabetic patients without active foot ulcer, convenience sample, Fremantle Hospital, Western Australia. | Quantitative Foot Score, the Nottingham Assessment of Functional Foot Care (NAFFC) survey score, 6–question survey of attitudes to foot complications | Foot score improved more with written education (p<0.001), Student’s t-tests, paired t-tests, Mann-Whitney U-tests, Wilcoxon signed rank tests; attitudes survey improved more with interactive education (p<0.031), (-) Western Australia (+) various methods of delivering diabetic education |}

| involvement in the diabetic foot pathway: A pilot randomized controlled trial. Diabetic Medicine. | behavioral outcomes | Decision Navigation intervention, usual care, decision self-efficacy, foot treatment adherence reported by patient, foot treatment adherence reported by provider. | years, randomized, clinic site in the Royal Infirmary in Edinburgh, UK. | Quality of Life Scale (EQ-5D), Decisional Self-Efficacy Scale (DSE), Decisional Conflict Scale, Decisional Regret Scale, provider adherence questionnaire, patient adherence questionnaire | control groups; One-way ANOVA, Chi-squared analysis | newly diagnosed foot ulcer (+)include patient beliefs and behaviors of motivation and self-control in intervention |
| Dorresteijn (2014). Patient education for preventing diabetic foot ulceration. Cochrane Database of Systematic Reviews. | Evidence-based literature review of diabetic foot education | Systematic review, Level I. Variables patient education, diabetic foot ulcers, foot care knowledge, self-foot exams. | 12 RCTs, type I or type II diabetic patients ≥18 years old, randomized, various clinic and hospital settings. | Foot Care Knowledge scores, self-reported self-care, observed self-care, etc. | Self-foot care and knowledge are somewhat impacted by education; Meta-analysis not done, heterogeneity of the RCT’s | Fisher’s exact or McNemar’s or McNemar-Bowker tests, Student’s t-test and linear regression, generalized linear modeling. |
| Stock (2014). Chronic care model strategies in the United States and Germany deliver patient-centered, high quality diabetes care. Health Affairs. | Determine effect of chronic care model interventions on type 2 diabetic patient care | Cross-sectional study, Level 4, chronic care model interventions, patient centered care. | 4162 type 2 diabetic patients enrolled in either Germany (Barmer sickness fund/nationwide health insurance), or U.S. (Geisinger Health Plan), randomized, U.S. and Germany. | Patient Assessment of Chronic Illness Care survey, internal validity 0.87-0.93/100, reliability 0.97. | Significant differences between patients receiving the chronic care model interventions and control group in rates of trust in provider, questions answered, | (+)use of Chronic Care Model with interventions |

Determine effect of a web-based registry and interactive diabetic education on patient outcomes HgbA1C, BP, lipids


1212 adult patients with diabetes, non-randomized, voluntary, small to medium sized primary care practices (7 sites) in New York’s Hudson Valley.

Odds ratios for time effects from compliance regression models

HgbA1C (p<0.001), LDL (<0.001), and BP (<0.001 – 0.003) improved with implementation of registry, random-effects logistic models, random-effects linear regression

Provider satisfaction quality of life, high-quality and collaborative care, Multivariate linear regression, Pearson chi-square tests, Mann-Whitney U-test, Bonferroni Holm method.

(-)high frequency of visits (+)similar patient population, setting (+)interactive intervention increased patient engagement, provider adherence to guidelines
<table>
<thead>
<tr>
<th>Study</th>
<th>Type of Study</th>
<th>Research Design</th>
<th>Participants</th>
<th>Measures</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chin (2012).</td>
<td>Qualitative</td>
<td>Non-experimental, cross-sectional survey or observational study, Level 4</td>
<td>277 patients with diabetes and peripheral neuropathy</td>
<td>Family APGAR tool, self-report, likert 0-4, Cronbach alpha of 0.87; Diabetic Foot Ulcer Health Belief Scale (DFUHBS) questionnaire – subdivided into 3 subscales, Likert 1-5. Cronbach alpha of 3 subscales was 0.88, 0.84, 0.80</td>
<td>Demographic factors were associated with daily foot exams. Logistic regression.</td>
</tr>
<tr>
<td>Heinrich (2012).</td>
<td>Quantitative</td>
<td>Randomized controlled trial, Level 2</td>
<td>564 type 2 diabetic patients aged 40-70, randomized, Netherlands.</td>
<td>Linear regression on knowledge at post-test, R2 = 0.67; effect of the group on knowledge</td>
<td>Post-test knowledge scores higher compared to baseline (p&lt;0.05; ES = 40); older participants had lower post-test knowledge score (p&lt;0.047)</td>
</tr>
</tbody>
</table>

**Note:**

(+) = Include behavior effects on foot exam
(-) = Limit to patients diagnosed with diabetic neuropathy
(+*) = Hospital setting in Taiwan
(+) = Include patient behavior in education intervention
(+) = Tool for intervention
(-) = Dutch study
(+) = Limit web-based project intervention
<table>
<thead>
<tr>
<th>Education and Counseling.</th>
<th>Foot Care Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pocuis (2017). Exploring diabetic foot exam performance in a specialty clinic. Clinical Nursing Research.</strong></td>
<td>Determine effect of provider foot exam frequency on patient foot exams, patient behavior effect on frequency of exams. 88 patients, convenience, one U.S. urban diabetes care clinic. Diabetic Foot Ulcer Health Belief Scale (DFUHBS) questionnaire. Likert 1-5. Cronbach alpha not reported. No relationship between action cues (clinician foot exam) and patient foot exam. Daily foot exam group perceived fewer barriers to performing the exam. Descriptive statistics, t tests, chi-square, logistic regression, Pearson’s correlations. (-)one setting, not generalizable (+)include patient behavior in project interventions</td>
</tr>
<tr>
<td><strong>Simplicio de Oliveira (2016). Practice nurse family health strategy in the prevention of diabetic foot. Care Online.</strong></td>
<td>Assess current diabetic practices of family health nurses. Descriptive study with quantitative approach, Level 6. 38 nurses, non-randomized, Family Health Units in Brazil. Two-part questionnaire. 68.4% nurses guide on use of comfortable shoes, 44.7% on clipping nails in a straight line, 34.2% on proper feet hygiene, 34.2% on feet hydration, (-)Brazil setting (+)insight of frequency of exam, types of foot care, and attitudes of nurses in diabetic foot care</td>
</tr>
<tr>
<td>Study</td>
<td>Type of Review</td>
</tr>
<tr>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>Morey-Vargas (2015). BE SMART: Strategies for foot care and prevention of foot complications in patients with diabetes. Prosthetics and Orthotics International.</td>
<td>Review of available research in diabetic foot preventative care</td>
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<tr>
<td>Importance of Care</td>
<td>Care Wied (2018). Avoidable 30-day mortality analysis and failure to rescue in dysvascular lower extremity amputees. Acta Orthopaedica.</td>
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## Type 2 Diabetic Foot Exam Education

<table>
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<tr>
<th>Phillips (2016). Optimising the person-centred management of type 2 diabetes. British Journal of Nursing.</th>
<th>Reinforcement of individualization, patient involvement in diabetes care</th>
<th>Expert opinion, Level 7.</th>
<th>N/A</th>
<th>N/A</th>
<th>Incidence, prevalence, risk factors, and consequences of poorly managed diabetes carry enormous burdens; guidelines with individualized approaches must be used to control hyperglycemia which directly affects microvascular complications.</th>
<th>(-) low level of evidence (+) guideline-based interventions</th>
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<tr>
<td>Banuelos-Barrera (2013). Risk factors of foot ulceration in patients with diabetes mellitus type 2. Investigación y Educación en Enfermería.</td>
<td>Identify risk factors for foot ulceration</td>
<td>Descriptive cross-sectional study, Level 4. Variables socio-demographic, anthropometric, clinical, biochemical variables, foot</td>
<td>87 patients with type 2 diabetes, age &gt; 30 years, mean age 58.8 +/- 12.2 years, non-randomized, primary care center in Colima Mexico.</td>
<td>International Working Group on the Diabetic Foot risk categorization, direct observation, questionnaire, Lack of education on foot care, low rates of previous foot exam by providers, &gt;60% of patients were found to be at risk of ulceration, &gt;</td>
<td>(-) study in Mexico (+) similar patient age (+) low number of diagnosed and/or told of diagnosis peripheral neuropathy (+) lack of care</td>
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</table>
exam rates, education.

ankle-brachial index.

12% were found to have peripheral vascular disease, 24.1% had peripheral neuropathy, 50.6% had foot deformity.

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<th>Guidelines</th>
<th>Standards of care for diabetic foot clinical practice.</th>
<th>Expert opinion, evidence-based report of ADA, Level 1.</th>
<th>N/A</th>
<th>N/A</th>
<th>N/A</th>
<th>(-) vague recommendations (-) no standardized exam described with options for exam (+) provide standards of care for neuropathy, review of neuropathy, and screening recommendations</th>
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<td>American Diabetes Association (ADA) (2018). Standards of Medical Care in Diabetes Microvascular complications and foot care. Diabetes Care.</td>
<td>Expert recommendations for preventing diabetic foot ulceration, off-loading diabetic foot ulcers (DFU’s), diagnosis of</td>
<td>Expert opinion, report from the Society for Vascular Surgery, American Podiatric Medical Association,</td>
<td>N/A</td>
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<td>(-) recommended annual foot exam differs from ADA guideline (-) vague wording (+) at least annual foot exam by provider consistent with ADA</td>
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<td>Surgery in collaboration with the American Podiatric Medical Association and the Society for Vascular Medicine. Journal of Vascular Surgery.</td>
<td>diabetic foot osteomyelitis, wound care for DFU’s, and peripheral arterial disease and the DFU</td>
<td>and Society for Vascular Medicine, Level 7.</td>
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<td>(+)patient and family education promoted (+)un-necessary practices reviewed as well</td>
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<td>International Working Group on the Diabetic Foot (2015). Definitions and criteria.</td>
<td>Standardized definitions and criteria for classifying diabetic foot conditions.</td>
<td>Expert opinion, report of IWGDF, Level 7.</td>
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<td>(+)provides standardized working definitions and criteria for diabetic foot conditions.</td>
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<td>Boulton (2008). Comprehensive Foot Examination and Risk Assessment. Diabetes Care.</td>
<td>Recommendations for components of foot exam, risk factors, risk classification, referral, follow up</td>
<td>Expert opinion, report of ADA, Level 7.</td>
<td>N/A</td>
<td>N/A</td>
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<td>(+)provide standards of care for diabetic foot (+)thorough review &amp; instruction of multiple testing</td>
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Appendix E, Theory to Application Diagram

Patient education tool shows quick, comprehensive daily self-foot exams; care team positive feedback; phone call follow up allows additional education

Care team/ stakeholder involvement in project and buy-in of importance of daily self-foot exams

Chronic Care Model

Delivery System Design

Clinical Information Systems

Decision Support

Self Management Support

Chronic Care Model

Community Resources and Policies

Health Systems

Document and discuss frequency of daily self-foot exams, behavioral barriers to exams, education, podiatry resources

Appendix F, IRB Determination Letter

NOT HUMAN SUBJECTS RESEARCH DETERMINATION

Principal Investigator: Dr. Lyla Lindholm
UMKC Health Sciences Building
Kansas City, MO 64108

Protocol Number: 15-207
Protocol Title: Effect of Interactive Education on Self-foot Exams in Type 2 Diabetes
Type of Review: Not Human Subjects Determination

Date of Determination: 10/01/2015

Dear Dr. Lindholm,

The above referenced study, and your participation as a principal investigator, was reviewed and determined to be Not Human Subjects Research (NHSS). As such, your activity falls outside the parameters of IRB review. You may conduct your study, without additional obligation to the IRB, as described in your application.

The NHSS Determination is based upon the following Federally provided definitions:

"Research" is defined by these regulations as "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge."

The regulations define a "Human Subject" as "a living individual about whom an investigator (whether professional or student) conducting research obtains data through intervention or interaction with the individual, or identifiable private information."

All Human Subjects Research must be submitted to the IRB. If your study changes in such a way that it becomes Human Subjects Research, please contact the Research Compliance office immediately for the appropriate course of action.

Please contact the Research Compliance Office (email: umkcreb@umkc.edu; phone: (816)329-5827) if you have questions or require further information.

Thank you,
## Appendix G, Project Timeline

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<th>Month 2018</th>
<th>Events</th>
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<td>May 2018</td>
<td>5/15 complete project design</td>
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<td>5/20 communicate with potential site</td>
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<tr>
<td>June 2018</td>
<td>6/1 review potential funding</td>
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<td>6/21 meet with site administration</td>
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<tr>
<td>August 2018</td>
<td>8/20 submit to IRB</td>
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<td>September 2018</td>
<td>9/20 meet with Midwest outpatient clinic staff, training, emails, verbal communication</td>
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<td>October 2018</td>
<td>10/24 meet with site staff, training</td>
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<td>continuous formal/informal training</td>
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<td>November 2018</td>
<td>11/5 Implementation/enrollment start</td>
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<td>11/9 Poster presentation at APNO</td>
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<td>continuous enrollment/intervention and 2 week follow up</td>
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<tr>
<td>December 2018</td>
<td>continuous enrollment/intervention and 2 week follow up</td>
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<td>January 2019</td>
<td>1/30 meet with site staff</td>
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<td></td>
<td>continuous enrollment/intervention and 2 week follow up</td>
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<td>February 2019</td>
<td>2/20 last patient enrolled; enrollment commences</td>
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<td>2/27 meet with site staff</td>
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<tr>
<td></td>
<td>continuous 2 week follow up</td>
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<tr>
<td>March 2019</td>
<td>3/8 commence follow-up</td>
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<td>3/25 communicate preliminary results to office/staff</td>
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<tr>
<td>April 2019</td>
<td>4/18 communicate results to office/staff</td>
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<tr>
<td>November 2019</td>
<td>11/8 poster presentation at APNO</td>
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Appendix H, Intervention Flow

Convenience sampling recruitment November 5, 2018 to February 20, 2019
- EMR weekly schedule, identify type 2 dm > age 50 potential patients
- Project information at patient check-in by front desk staff
- Given letter, survey to complete, written education, clipboard, pen

At Appointment/exam room
- Take completed survey and education into exam room
- Discuss survey and daily self-foot exam education with provider
- Survey kept for student investigator, education given to patient to keep

Two week follow up
- Student investigator calls patient
- Frequency of self-foot exams asked again, additional education, resources
- Answers recorded into database

Student investigator gathers results of all data through March 8, 2019
- Student investigator completes all data entry in Redcap and SPSS
- Analysis of data
- Dissemination including manuscript submission of project
Appendix I, Recruitment Materials

**Diabetes Project**

Hello,

Please consider participating in my UMKC School of Nursing diabetes project. The project is to study foot exams being done by patients in their homes.

If you will please participate, I will ask that you fill out a short one-page questionnaire today and look at the education page. I will also call you in two weeks for follow-up.

Participation is greatly appreciated. You will receive a Target or Walmart gift card for $10 for your time.

Thank you very much.

Jennifer Branch, APRN
Kansas City Kidney Consultants
Appendix J, Intervention Materials

Foot Care Survey

Study Number:__________ Name:________________________ Age:______ Gender:__________

Education: Some high school_____ High school graduate_____ Some college_____ Bachelor’s degree_____ Graduate degree_____

Do you check your feet every day? Yes_____ No____
When do you check your feet? Every day_____ Once a month_____ Once a year_____ Never____

I forget to check my feet every day.
Strongly Disagree   1  2  3  4  5  Strongly Agree

I am too busy to check my feet every day.
Strongly Disagree   1  2  3  4  5  Strongly Agree

I do not check my feet every day because it is too much trouble.
Strongly Disagree   1  2  3  4  5  Strongly Agree

I cannot check my feet every day because I cannot see or reach my feet.
Strongly Disagree   1  2  3  4  5  Strongly Agree

I cannot check my feet every day because I cannot find someone to help me.
Strongly Disagree   1  2  3  4  5  Strongly Agree

I do not check my feet every day because I have more important things to deal with.
Strongly Disagree   1  2  3  4  5  Strongly Agree

I cannot take care of my feet. I feel embarrassed to find someone to help me wash and check my feet.
Strongly Disagree   1  2  3  4  5  Strongly Agree

Do you understand these questions and this survey? Yes_____ No____
Do you understand the foot care education page? Yes_____ No____
The nurse practitioner will call your home for a second foot care survey in 2 weeks. Thank you!
Foot Education

You are important – Your feet are important

Did you know diabetes can hurt your feet? Please look at your feet every day. It won’t take long.

Look at your skin. What color is it? Do you have any cuts? Do you have a sore? Do you see hair on your toes?

Touch your skin. Is it cold or hot? Do your feet hurt? Can you feel things or are your feet numb? Do they tingle? If your feet are numb it is easier to get an ulcer or infection.

Is the space between your toes clean? Washing your feet with soap and water every day can help prevent infection.

Look at the bottom of your feet. Do you have rough or thick spots? Let your doctor’s office know if you have a sore or wound on your feet. You might have an infection that needs to be checked.

Please look at both feet every day. Check the bottom and top, between the toes, and the toenails each day. If you cannot see your feet please ask a friend, family, or someone to look for you every day.

It is easier to treat a sore or foot infection if it is caught early.

Please take this paper to your doctor or nurse practitioner today.
Appendix K, Logic Model
## Logic Model for DNP Project

### Student: Jennifer Branch

**Inquiry, PICOTS:** In type 2 diabetic adult patients over the age of 50 (P), does interactive diabetic foot exam patient education (I) compared to no interactive diabetic foot exam patient education (C) impact patient self-foot exam frequency for daily self-foot exams (O) during a 5 month period (T) at an outpatient clinic setting (S).

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<th>Inputs</th>
<th>Intervention(s)</th>
<th>Outputs</th>
<th>Short</th>
<th>Medium</th>
<th>Long</th>
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<td>Evidence, sub-topics</td>
<td>EBP intervention which is supported by the evidence in the Input column (brief phrase) Interactive diabetic foot exam patient education</td>
<td>The participants (subjects) Type 2 diabetic adult patients over the age of 50</td>
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<td>Site Kansas City Kidney Consultants practice</td>
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<td>Time Frame 5 months</td>
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<td>Other person(s) collecting data (yes,no) no</td>
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<td>Others directly involved in consent or data collection (yes/no) yes</td>
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<tr>
<td>Major Facilitators or Contributors</td>
<td>Major steps of the intervention (brief phrases) 1. Patient given survey and education 2. Patient completes survey and reviews education 3. Patient gives survey and education to provider in exam room for interactive education. Patient takes education home. 4. Survey to student investigator 5. Two week follow up</td>
<td>(Completed during DNP Project) Outcome(s) to be measured 1. Primary: number of self-foot exams post intervention 2. Secondary, if applies: patient perceived barriers to daily self-foot exams</td>
<td>(after student DNP) Outcomes to be measured</td>
<td>Increased number of patients who perform daily self-foot exams post intervention</td>
<td>Decreased perceived barriers to daily self-foot exams</td>
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<td>Measurement tool(s) 1. Survey based on the Diabetic Foot Ulcer Health Belief Scale (DFUHBS)</td>
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<td>Statistical analysis to be used 1. Descriptive Statistics 2. Pearson Chi-Square, Spearman’s rho 3. McNemar Test</td>
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<td>Major Barriers or Challenges</td>
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<td>(after student DNP) Outcomes that are potentials</td>
<td>Increased and sustained ongoing daily self-foot exams</td>
<td>Decreased rates of infection, ulcer, cellulitis, amputations</td>
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</table>

**Outcome(s) to be measured**
- Increased number of patients who perform daily self-foot exams post intervention
- Patient perceived barriers to daily self-foot exams

**Outcomes that are potentials**
- Increased and sustained ongoing daily self-foot exams
- Decreased rates of infection, ulcer, cellulitis, amputations

**Measurement tool(s)**
- Survey based on the Diabetic Foot Ulcer Health Belief Scale (DFUHBS)

**Statistical analysis to be used**
- Descriptive Statistics
- Pearson Chi-Square, Spearman’s rho
- McNemar Test

**Other person(s) collecting data (yes,no) no**
- Others directly involved in consent or data collection (yes/no) yes
## Appendix L, Data Collection Template

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Appendix M, Permission for Tools

On May 2, 2018 the student investigator received permission by text from Jesse Pocuis to use the Diabetic Foot Ulcer Health Belief Scale. Permission granted.

On May 5, 2018 the student investigator received permission by email from Sam Li to use the Diabetic Foot Ulcer Health Belief Scale. Permission granted.
### Appendix N, Statistical Analysis Table

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**McNemar Exact Sig 1-sided .035**  
**Pearson’s R, Spearman Correlation, p<.001**
Appendix O, Graphic Results

**Daily Exam Pre and Post-Intervention**

- Pre Yes Daily Exam: Post Yes Daily Exam: 60
- Pre No Daily Exam: Post No Daily Exam: 40

**Understanding of Survey**

- Pre Yes Daily Exam: Understands Survey: 80
- Pre No Daily Exam: Does Not Understand Survey: 20
September 17, 2018

UMKC IRB
Primary Project Site IRB
UMKC DNP Student

UMKC or Primary Project Site IRB, and DNP Student

This letter serves to provide documentation regarding Jennifer Branch’s Doctor of Nursing Practice (DNP) Project proposal. Ms. Branch obtained approval for her project proposal, "Effect of Interactive Education on Self-foot Exams in Type 2 Diabetes," from the School of Nursing and Health Studies DNP faculty on September 17, 2018.

If we can provide further information, please feel free to contact us.

Sincerely,

Cheri Barber, DNP, RN, PPCNP-BC, FAANP
Clinical Assistant Professor
DNP Program Director
UMKC School of Nursing and Health Studies
barberch@umkc.edu

Lyla Lindholm, DNP, ACNS-BC
Clinical Assistant Professor
DNP Faculty