

EXAMINATION OF FOOT CARE KNOWLEDGE AMONG AFRICAN
AMERICANS LIVING WITH TYPE 2 DIABETES

A Dissertation

by

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ABSTRACT

This dissertation presents three separate studies developed to provide structure and evidence-based insight into the characteristics associated with short term and long term foot self-care investments of African Americans living with type 2 diabetes. First, a systematic literature review of thirty-four empirical studies on foot care knowledge and foot self-care interventions in people living with type 2 diabetes will be presented to determine where further interventions and research are needed in foot care.

Secondly, a qualitative examination of common sense associations of lower extremity disease will be presented. Employing an emergent design, semi-structured interviews were conducted with African Americans with type 2 diabetes. The final sample size comprised 12 individuals. The Self-Regulatory Model of Illness Representations was proposed to assist in interpreting the qualitative findings and to theorize factors associated with making common sense assumptions about type 2 diabetes risks and disease progression.

Lastly, a quantitative examination of foot care knowledge using a previously validated foot care questionnaire will be discussed. Qualtrics (Provo, Utah) served as the host site for both pilot- and final testing phases of the questionnaire, but hard copies of the questionnaire were also distributed to participants. The final sample comprised a convenience and snowball sample of African Americans living with type 2 diabetes. Principal components analysis identified six subscales with satisfactory internal consistency ($\alpha = 0.77-0.91$).

Prior to this study, very few interventions were available addressing foot care knowledge and self-care skills within African Americans with type 2 diabetes, very few studies were available that attempted to understand common sense associations of illness representations in African Americans with type 2 diabetes, and there was no standardized instrument for measuring foot care knowledge and foot self-care among people with type 2 diabetes, despite the devastating effects lower extremity complications have on quality of life. Thus, this study attempts to address the limitations associated with foot care knowledge and foot self-care skills research and interventions.

DEDICATION

To my parents and my sister for their undying love and complete support.

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CHAPTER I

INTRODUCTION

There are three major classifications of diabetes mellitus: type 1 diabetes, type 2 diabetes, and gestational diabetes. Type 1 diabetes (T1DM) represents less than 10% of all cases of diabetes mellitus around the world (Thrower and Bingley, 2014). T1DM is characterized by destruction of beta-islet cells in the pancreas, leading to complete insulin deficiency. The origins of this autoimmune condition are idiopathic (Alberti & Zimmet, 1998). The typical onset of this condition is between childhood and adolescences (Roper et al., 2009). The lack of insulin as well as the body's immune system destroying the beta islet cells places a person with T1DM in serious danger, with the most dangerous being diabetic ketoacidosis (Silverstein et al., 2005).

Gestational diabetes is characterized by impaired glucose intolerance that has been diagnosed during the first pregnancy (Egan & Dinneen, 2014; Kim, Newton, & Knopp, 2002).

Following the gestation diabetes diagnosis, the woman has very significant chance of developing type 2 diabetes (Mayorga, Reifsnider, Neyens, Gebregziabher, & Hunt, 2013). A diabetes diagnosis early in gestation has also been associated with fetal loss, perinatal mortality, and birth defects (Mayorga, Reifsnider, Neyens, Gebregziabher, & Hunt, 2013).

Type 2 diabetes (T2DM) has usually been described as insulin resistance, but can be classified as a defect in the pancreas' ability to secrete insulin properly (Shah &

Vella, 2014). Roughly 24 million people are affected by diabetes in the United States, almost 90% of those cases are of T2DM (Shah & Vella, 2014). This condition usually affects adults at alarming rates, with warning signs of increased urination, increased thirst, and increased hunger (Alberti & Zimmet, 1998). Associated complications of type 2 diabetes includes cardiovascular disease, retinopathy, renal disease, neuropathy, and lower extremity amputations (Centers for Disease Control and Prevention, 2008). The potential combination of associated complications often requires the person living with type 2 diabetes to develop an effective self-care management regimen.

The World Health Organization defines self-care as the “activities individuals, families, and communities undertake with the intention of enhancing health, preventing disease, limiting illness, and restoring health” (Becker, Gates, & Newsome, 2004, p. 2066). With the emergence of self-care as an integral piece of maintaining optimal health, the part that culture play in this concept has been underemphasized (Becker, Gates, & Newsome, 2004). Heisler and colleagues (2002) noted that a person’s self-care behavior has a huge impact on morbidity and mortality related to type 2 diabetes. Diabetes self-management education has been shown to play a critical role in how individuals with type 2 diabetes manage this condition, as well as improve related health outcomes (Funnel et al., 2009).

Someone managing a type 2 diabetes diagnosis is presented with management challenges that, at times can be very intimidating (Heisler, Reynard, Hayward, Smith, & Kerr, 2002). Becker, Gates & Newsome (2004) noted that African Americans have even more management challenges due to having to practice optimal self-care behaviors while

striving to overcome issues of oppression and racism. Improving patient provider communication and participatory decision making have both resulted improved quality of life, better adherence to treatment plans, and overall satisfaction (Heisler et al., 2002). Communication is the key to making sure people with type 2 diabetes receive the services and care they need (Funnel et al., 2009).

Of all the three types of diabetes conditions, type 2 diabetes makes up 95% of all disease cases, and has been shown to have a disproportionate burden in African American populations (Scollan-Koliopoulos, 2004). In the United States, the incidence of diabetes mellitus continues to increase. In 2007, almost 12% of African Americans over the age of 20 were diagnosed with this condition (Scollan-Koliopoulos, 2004). African Americans only comprise around 30 million of the total US population, but of that number, more than 1 million African Americans suffer from this condition (Scollan-Koliopoulos, 2004).

African Americans are diagnosed with type 2 diabetes at alarming rates, often suffering from the burden of morbidity, amputation, and death that often accompanies complicated cases. The condition, like most chronic illnesses, varies in severity. Lower extremity amputations are one of the most debilitating complications of type 2 diabetes (Scollan-Koliopoulos, 2004). African Americans undergo some type 2 major amputation almost 4 times as much as non-Hispanic whites (Scollan-Koliopoulos, 2004), and this gap continues to increase with increasing age (Feinglass, Abadin, Thompson, & Pearce, 2008). Type 2 diabetes related lower extremity amputations create severe consequences for someone living with this condition in terms overall management, physical

restrictions, psychosocial restrictions, and financial restrictions (Scollan-Koliopoulos, 2004). Scollan-Koliopoulos (2004) went on to say that peripheral neuropathy and peripheral vascular disease often accompanies diabetic related infections, ultimately leading to having an at-risk lower limb (Scollan-Koliopoulos, 2004). Compromised wound healing, along with nerve damage and ulceration, has been long thought to be the root causes of lower extremity amputations (Lavery, Armstrong, Wunderlich, Tredwell, & Boulton, 2003). Survival rates following diabetes related amputations have been shown to be as high as almost 70% post amputation (Scollan-Koliopoulos, 2004).

Lifestyle behavior change has posed a great challenge to the self-management of diabetes (Utz et al., 2008). For diabetics with at-risk limbs, this lifestyle behavior change may reduce the progression of end-stage disease, which has been found to be responsible for bulk of health care costs, morbidity, mortality, and overall decreased quality of life (Dorsey, Eberhardt, Gregg, & Geiss, 2009). Utz et al. (2008) notes that the national recommended standard of care for someone living with type 2 diabetes is to receive care from multidisciplinary health care team, that includes doctors, nurses, as well as dieticians.

It is possible to use diabetes related knowledge and foot care skills initiative to achieve the Healthy People 2020 objective of reducing the disease related complications and mortality that surround a type 2 diabetes diagnosis (Scollan-Koliopoulos, 2004). The disparity in health and health care access should be taken into complete consideration during the design of interventions to improve health outcomes for African Americans (Melkus et al., 2010). Experts have advocated for comprehensive interventions to assist a

person with the multifaceted challenges of self-management (Melkus et al., 2010). Despite accredited self-care management programs being implemented in various health care settings, minority utilization of those programs is low (Melkus et al., 2010). Although there is overall agreement that self-care management plays an integral part of managing any chronic illness, little is known about those self-care skills of chronically ill African Americans (Becker, Gates, & Newsome, 2004).

The underlying principle for this dissertation study is to provide evidence-based insight into the foot care knowledge, foot care practices, and any barriers to foot self-care in African Americans living with type 2 diabetes. More specifically, this dissertation will: (1) Examine the current body of literature regarding foot self-care knowledge and foot self-care practices interventions within the United States; (2) Present findings from semi-structured interviews of African Americans living with type 2 diabetes to identify how common sense assumptions of their individual type 2 diabetes diagnosis shapes foot self-care practices; and (3) Discuss the foot care knowledge questionnaire that was designed to measure relationship that self-reported foot care knowledge, foot self-care behaviors, and any barriers that may prevent adopting good foot care had on a participants' intention to maintain long term foot self-care.

This document has been divided into five chapters. Chapters II-IV were written in manuscript format, and each represent independent studies to be submitted for publication in refereed journals. The chapter descriptions are as follows:

- Chapter I: This chapter provides a brief review of the topic to be explored in greater detail throughout this document, including the rationale and purpose of this research study.
- Chapter II: A systematic literature review of the current body of literature surrounding foot self-care knowledge and foot self-care practices interventions in a type 2 diabetes population is discussed. This comprehensive review is only of studies that have taken place within the United States, and cover a range of research designs including random control trials, surveys, cross-sectional analyses, cohort studies, case studies, and qualitative inquiries.
- Chapter III: Qualitative findings from semi-structured interviews of African Americans living with type 2 diabetes are presented in this chapter. The findings examine how common sense assumptions of type 2 diabetes severity and complications based on current knowledge affects foot self-care practices.
- Chapter IV: Quantitative findings from a foot care knowledge questionnaire of African Americans living with type 2 diabetes are presented in this chapter. The findings examine foot care knowledge, foot care practices, and barriers to adequate foot care that may prevent the participants from adopting good foot care leading to long term adequate foot self-care.
- Chapter V: Conclusions of the research study in its entirety will be discussed in this chapter. Strengths and limitations of the dissertation study, as well as future implications and directions for diabetes educators, diabetes researchers, and health care providers will be discussed. References and appendices will follow this chapter.

CHAPTER II
FOOT CARE KNOWLEDGE AND FOOT SELF-CARE PRACTICE
INTERVENTIONS WITHIN TYPE 2 DIABETES POPULATIONS: A SYSTEMATIC
REVIEW OF THE LITERATURE

Introduction

With an impact of over 300 million people worldwide, diabetes has become the fastest developing chronic disease (Matricciani & Jones, 2015). Despite cases of unreported causes of death in the United States, diabetes (T2DM) has still been noted as the seventh leading cause of death in 2006 (Grady, Entin, Entin, & Brunye, 2011). Lifestyle behavior changes are required for management of this condition, including physical activity, dietary changes, monitoring blood glucose levels, and adherence to medication (Smalls et al., 2012). The quality of life of someone living with T2DM can be greatly improved with the implementation of self-management education to help them manage the condition (Grady, Entin, Entin, & Brunye, 2011). Similar to how continuing education is essential for healthcare providers, there must also be continuous education for the person that is battling T2DM (Beebe & Schmitt, 2011). According to AADE7 Self-Care Behaviors framework, people with T2DM should be skilled in self-care behaviors that improve their quality of life while reducing associated complications of this condition (Boren, Gunlock, Schaefer, & Albright, 2007). Those skills needed to accomplish this include: monitoring of blood glucose levels, monitoring of blood pressure, eliminating smoking, foot self-checks, and routine eye, foot, and dental exams

(Boren, Gunlock, Schaefer, & Albright, 2007). Self-care management has the capacity to reduce the gap between patient needs and available health care services to meet those needs (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002). Health care providers much equip patients with the tools needed to effectively monitor their blood glucose levels, maintain any dietary restrictions, and be active participants in their individual self-care to control their disease (Fowler, 2011).

Uncontrolled T2DM has serious health implications other than chronic hyperglycemia, such as heart disease, stroke, retinopathy, neuropathy, and nephropathy (Grady, Entin, Entin, & Brunye, 2011). The complications do not end there; lower extremity amputations comprise over 60% of non-traumatic amputations in the United States (Neder & Nadash, 2003). These T2DM related lower extremity amputations cause critical implications for individuals, family members, and care takers in terms of psychosocial, physical, functional, and financial implications (Scollan-Koliopoulos, 2004). T2DM related complications account for a death risk that is 2 times more than that of someone that does not have T2DM (Center for Disease Control and Prevention, 2008). However the development of such complications can be prevented and reduced through the implementation of comprehensive programs focused on foot care, which have been shown to greatly reduce amputation rates (Neder & Nadash, 2003).

T2DM foot complications, which more often affect older adults, have the capacity to diminish a person's quality of life (Matricciani & Jones, 2015). Foot self-care behaviors, including daily feet inspection, professional treatment, hygiene, and proper shoe gear help minimize the risk of foot complications (Matricciani & Jones, 2015).

T2DM is multifaceted and requires a multidisciplinary approach to the treatment of the condition and prevention of associated complications (Wu, Driver, Wrobel, & Armstrong, 2007). . McCook-Martinez et al (1979) found that when a patient was properly informed about foot care, disease associated morbidity, hospitalization, and amputation rates were lower than those that did not have foot care information (Kruger & Guthrie, 1992). Lavery and colleagues (2005) noted a reduction in hospitalizations and amputations in the study that developed a lower extremity disease management program that included lower limb screening and treatment protocols for the at risk foot within a health care facility (Kruger & Guthrie, 1992). Despite evidence of the success of multidisciplinary approaches to T2DM care, this approach to care has yet to be fully implemented as part of the standard of care (Lavery, Peters, & Armstrong, 2008). The purpose of this systematic literature review was to compile and evaluate published evidence for increasing foot care knowledge and self-care practices as part of a targeted type 2 diabetes foot care intervention.

Methods

This systematic review contains research studies of foot care knowledge and foot care practices interventions. The inclusion criteria was limited to studies that evaluated type 2 diabetes related foot care knowledge and foot self-care interventions. We excluded studies that were not peer reviewed, that did not discuss type 2 diabetes, contained no element of type 2 diabetes related lower extremity complication, were not in English, and were not conducted within the United States.

Search

Medline (OVID), CINAHL (Ebsco), CENTRAL (Wiley Cochrane), and Cochrane Central Register of Controlled Trials databases were searched using the following combinations of search terms: (1) diabetes mellitus, type 2 diabetes, type II diabetes, non-insulin dependent diabetes, diabetic foot, or diabetes complications; (2) foot care, self-management, self-care, self-care knowledge, health knowledge, health activities, health practice, preventive care, preventive health, or preventive health services; and foot, feet, toes, podiatry, or diabetic foot. The Medline search was modified for the other databases. The reference lists of the studies included in the evaluation were also searched systematically for any eligible studies that may have been overlooked, but were not included.

Selection and Validity Assessment

Two investigators (TJB and ESL), independently reviewed publications by title and abstract according to the above mentioned criteria by rating the studies with a yes or a no. The studies that were designated as yes were then reviewed by full text. The methodologies and findings of the inclusion articles were then reviewed by one investigator (TJB) for validity assessment, which included determining whether the studies were described in sufficient enough detail to include in the current review. The Strength of Recommendation Classification Scheme (Shekelle, Woolf, Eccles, & Grimshaw, 1999) was one of the quality assessment tools utilized for this review (Table 1). This classification scheme uses a hierarchy to rank the strength and validity of evidence from each study included in this systematic review. This scheme allowed the

investigators to rank the strength of not only randomized controlled trials, but also the strength of observational studies, cohorts, case control studies, case series, and case reports, many of which have also been included in this systematic review. The included studies were also appraised using the Strength of Reporting Observational Studies in Epidemiology (STROBE) tool (Table 2) (Vandenbroucke et al., 2007). This tool was also used because it addressed cohort, case-control, and cross-sectional studies, which have been included in this review (Vandenbroucke et al., 2007). The tool consists of 22 items, but the last item, funding, was omitted from the checklist, which brings the tool to 21 items (Matricciani & Jones, 2015).

Table 1: Strength of Recommendations Classification Scheme

IA	Evidence for meta-analysis of randomized, controlled trials
IB	Evidence from at least one randomized, controlled trial
IIA	Evidence from at least one controlled study without randomization
IIB	Evidence from at least one other type of quasi-experimental study (non-randomized)
III	Evidence from non-experimental descriptive studies, such as comparative studies, correlation studies, and case controlled studies
IV	Evidence from expert committee reports or opinions or clinical experience of respected authorities

Shekelle, Woolf, Eccles, & Grimshaw, 1999

Table 2: Strength of Reporting Observational Studies in Epidemiology

	Item	Recommendation
Title and Abstract	1	(a) Indicate the study's design with a commonly used term in the title and abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
INTRODUCTION		
Background/ Rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
METHODS		
Study Design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias

Table 2: Continued

	Item	Recommendation
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical/ Methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) Cohort study—If applicable, explain how loss to follow-up was addressed Case-control study—If applicable, explain how matching of cases and controls was addressed Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy
RESULTS		
Participants	13	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive Data	14	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) Cohort study—Summarize follow-up time (eg, average and total amount)
Outcome Data	15	Cohort study—Report numbers of outcome events or summary measures over time Case-control study—Report numbers in each exposure category, or summary measures of exposure Cross-sectional study—Report numbers of outcome events or summary measures

Table 2: Continued

	Item	Recommendation
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other Analyses	17	Report other analyses done—e.g. analyses of subgroups and interactions, and sensitivity analyses
DISCUSSION		
Key results	18	Summarize key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
GENERALIZABILITY	21	Discuss the generalizability (external validity) of the study results

Vandenbroucke et al., 2007

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

Data Extraction

Data abstraction was conducted by one investigator (TJB) using the Garrard's method of literature review procedures (Garrard, 2011). The information extracted from the included studies was then entered into tables including (1) author/year, (2) rank/score, (3) sample (size, ethnicity, and mean age), (4) intervention, and (5) results. The selected abstracts were then reviewed by another investigator (ESL). The second investigator (ESL) independently reviewed and extracted data from 18 of the 31 articles that were selected for the review. Any discrepancies between the two investigators' scores were then resolved through a second review of the abstracts, discussion of discrepancies, and a finalized consensus.

Results

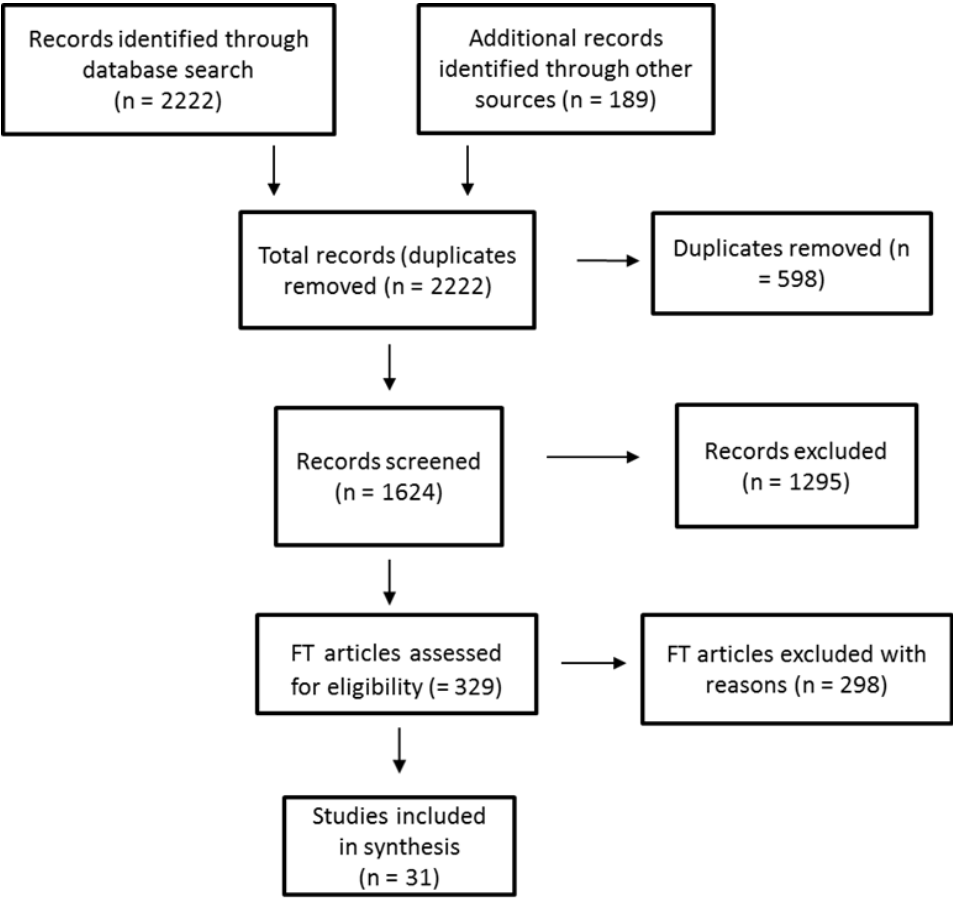
The literature search identified 1443 articles. The number of articles that were excluded at each stage of the selection process is presented in Figure 1. Articles were excluded after not meeting the inclusion criteria for the following reasons: (1) peer reviewed, (2) type 2 diabetes related, (3) lower extremity disease component as the basis of the study, (4) study conducted in the United States, and (5) foot care education or foot care practices intervention only in participants that were living with type 2 diabetes. As a result, 30 studies were included in this review.

Study Characteristics

The journals that have reported studies are from foot and ankle journals (n=2), diabetes journals (n=12), nursing journals (n=7), rehabilitation journals (n=4), and medical journals (n=6). The sample size of the studies ranged from 3 to 772, with the

median of 198.7. There were 2 studies examined type 1 diabetics along with the type 2 diabetics. There were 18 studies that included female participants, 21 studies that included male participants, and there were 9 studies that did not report the gender of the participants. One study that included Filipino participants, 17 that included African American participants, 5 studies that included Hispanic participants, 2 studies that included Native Americans, and 10 studies did not include racial/ethnic information of the participants.

Figure 1: Systematic Review Flow Diagram



Study Quality

This systematic review includes (Table 3) randomized controlled trials (n=9), survey (n=13), cohort studies (n=4), cross-sectional studies (n=2), qualitative studies (n=2), and case series (n=1). The Strength of Recommendation Classification Scheme (Shekelle, Woolf, Eccles, & Grimshaw, 1999) was used to rank the studies based on strength and validity (Atkins, 2010). 7 of the 9 randomized control trials received a 1B. Those that didn't receive a 1B received a 1C due to not describing the control group, not providing analysis for the intervention group, as well as not providing between groups analysis. All 13 survey studies received a rank of IIA. The cohort studies, case series, cross sectional studies, and the qualitative inquiries were assigned a rank of III. A modified version of the STROBE tool was used to appraise the included studies. The scores varied between 13 and 18 (out of 21). Majority of the included studies failed to report any how the study size was calculated or any source of bias. Most of the studies also acknowledged that there were limitations in generalizability of the results.

Table 3: Included Articles of Systematic Review

Study	Borges & Ostwald, 2008 (38)
Rank/Score	IB 18/21
Sample	N:167 Mean Age: 61.5 Ethnicity: 123 Hispanic/44 non-Hispanic
Intervention	Intervention Group: 5 minute foot risk assessment as well as behavioral and educational strategies incorporated into a 15 minute self-care intervention Control Group: Usual care

Table 3: Continued

Results	At follow-up, improvements were seen in the intervention group in self-assessed foot care. Foot checks, not walking barefoot, keeping skin moisturized, and not using sharp instruments were the 4 foot self-care behaviors that were notably different between the intervention and control groups
Study	Corbett, 2003 (31)
Rank/Score	IB 18/21
Sample	N: 40 Mean Age: Did Not Report Ethnicity: Did Not Report
Intervention	Intervention Group: Foot care education including topics surrounding self-reported foot care behavior, risk factors, foot care knowledge, and self-efficacy. Control Group: Usual care
Results	Compared to the control group, the intervention group showed considerable improvement in knowledge, self-efficacy, and self-reported foot care behavior at the 12 week assessment
Study	Grady, Entin, Entin, & Brunye, 2011 (2)
Rank/Score	IB 18/21
Sample	N: 155 Mean Age: 61.2 Ethnicity: Did Not Report
Intervention	Gain Framed: Viewed a gain-framed foot care education video, and completed four test sessions: before video, immediately after video, 3 month post video, and 6 month post video Loss Framed: Viewed a loss-framed foot care education video, and completed four test sessions: before video, immediately after video, 3 month post video, and 6 month post video
Results	Scores for the gain framed group were considerably higher at the 6 month follow-up than the loss framed group.
Study	Gravely, Hensley & Hagood-Thompson, 2011 (35)
Rank/Score	IB 18/21
Sample	N: 23 Mean Age: 54.3 Ethnicity: 3 African American /20 white

Table 3: Continued

Intervention	Control Group Usual educational material provided by health care facility 2 nd Intervention Group: Received the written educational material in video form 3 rd Intervention Group: Received both written and video education
Results	The second group had considerably higher scored compared to the third group and the control group.
Study	Kruger & Guthrie, 1992 (12)
Rank/Score	IB 18/21
Sample	N: 80 Mean Age: 54.5 Ethnicity: Did Not Report
Intervention	Intervention Group: Detailed sessions including foot washing, daily foot checks, explanation of corn and callus care, trimming toenails, detection of foot problems, and assessment of shoe gear Control Group: usual foot care education
Results	Although there were considerable improvements in the HbA1c of both the intervention and control groups, the intervention group showed improvements in daily foot checks, foot hygiene, and trimming toenails.
Study	Litzelman et al., 1993 (25)
Rank/Score	IB 18/21
Sample	N: 396 Mean Age: 60.4 Ethnicity: 152 African American / 244 Did Not Report
Intervention	Intervention Group: Received foot self-care education that included contractual agreements between the patient and health care provider on desirable foot care behaviors. The patients also were sent postcards of the agreed upon behaviors. Control Group: Usual Care
Results	As compared to the control group, the intervention group was less likely to have complicated skin lesions and abnormalities. The intervention group reported suitable foot self-care behaviors, as well as the receipt of professional foot exams and education materials.
Study	Malone et al., 1989 (26)
Rank/Score	IB 18/21

Table 3: Continued

Sample	N: 182 Mean Age: Did Not Report Ethnicity: Did Not Report
Intervention	Intervention Group: Bi-monthly education class held for one hour. Control Group: Usual care
Results	Compared to the intervention group, the control group had amputation rates 3 times higher, although there was little difference in the incidence of infection. The success rate of the intervention group was shown to be considerably higher than the control group
Study	Neder & Nadash, 2003 (8)
Rank/Score	IC 14/21
Sample	N: 40 Mean Age: Did Not Report Ethnicity: Did Not Report
Intervention	Intervention Group: Individualized foot care education for 6 weeks Control Group: Usual care
Results	As compared to the control group, the intervention group showed considerable improvements in foot self-care knowledge, foot care behaviors, and self-efficacy.
Study	Suico, Marriot, Vinicor, & Litzelman, 1998 (36)
Rank/Score	IC 15/21
Sample	N: 295 Mean Age: Ethnicity: 244 African American /51 Did Not Report
Intervention	Intervention Group: Received foot care education and physician reminders on desired behaviors Control Group: Usual Care
Results	As compared to those that regularly moisturized their feet, those that rarely moisturized their feet had 3.1 times higher chance of developing a foot lesion
Study	Bell et al., 2005 (39)
Rank/Score	IIA 17/21
Sample	N: 688 Mean Age: 74 Ethnicity: 216 African American /294 white/178 Native American

Table 3: Continued

Intervention	Summary of Diabetes Self-care activities questionnaire was distributed to rural older adults to assess the level of foot care skills.
Results	The foot self-care behaviors performed most often on 6-7 days were washing the feet and not soaking the feet
Study	Batista & Pinzur, 2005 (27)
Rank/Score	IIA 16/21
Sample	N: 202 Mean Age: 61 Ethnicity: Did Not Report
Intervention	10 question multiple choice questionnaire on foot self-care behavior
Results	Majority of participants were able to respond correctly to simple foot care questions
Study	Harwell et al., 2001 (40)
Rank/Score	IIA 17/21
Sample	N: 537 Mean Age: 75.3 Ethnicity: Did Not Report
Intervention	Telephone questionnaire distributed among Medicare beneficiaries. Further comparison performed on self-reported foot care behaviors and views on the risk for lower extremity amputations through the claims data.
Results	Almost 10% of respondents reported having a previous foot ulcers and a history of lower extremity anatomy. Around 30% of respondents were considered to have high risk lower extremities. Almost 50% of these at high risk for foot complications viewed themselves to be low risk. Very few of the participants conducted daily foot checks.
Study	Johnston et al., 2006 (41)
Rank/Score	IIA 17/21
Sample	N: 772 Mean Age: 67 Ethnicity: 95 African American /677 Did Not Report
Intervention	Questionnaire of foot self-care education and behaviors at eight VA medical centers

Table 3: Continued

Results	Almost 50% of participants reported receiving enough foot care education; Almost 70% of participants reported receiving enough education foot hygiene; Almost 60% of participants reported wearing shoes. Almost 30% reported receiving no information on who to contact in case of an emergency; Almost 20% reported a lack of foot self-care knowledge
Study	Ledda, Walker, & Basch, 1997 (28)
Rank/Score	IIA 16/21
Sample	N: 27 Mean Age: 63 Ethnicity: African American
Intervention	Self-care, take home program for the prevention of foot problems in African American with diabetes.
Results	Follow-up described positive reactions to the patient instruction booklet, and favorable response to the large hand held mirror, as well as an improvement in conducting daily foot checks.
Study	Munoz & Chang, 2009 (44)
Rank/Score	IIA 17/21
Sample	N: 352 Mean Age: 57 Ethnicity: 284 Latino/68 Did Not Report
Intervention	A short questionnaire to assess knowledge, attitudes, and practices about the prevention of lower extremity skin ulcer
Results	Participants that had diabetes had favorable rates of knowledge and attitudes about lower extremity skin care. Almost 50% of the Latino participants with diabetes confirmed daily foot checks, although less than 50% checked their shoes daily. Foot hygiene was conducted daily among almost 60% of the participants.
Study	Neil, 2002 (34)
Rank/Score	IIA 17/21
Sample	N: 61 Mean Age: 46 Ethnicity: 14 African American / 45 white/ 2 Hispanic American
Intervention	Short interviews and the Siriraj Foot-care questionnaire were administered to assess patient knowledge of foot care.

Table 3: Continued

Results	The questionnaire was divided into four sections: foot inspection, foot hygiene, nail care, and proper shoe gear. Of a possible score of 20, participants that had previous foot ulcers scored around 14. Scores showed that those with foot ulcers had comparable foot care behaviors as those without any ulceration.
Study	Rajan, Pogach, Tseng, Reiber, & Johnston, 2007 (30)
Rank/Score	IIA 17/21
Sample	N: 772 Mean Age: 67 Ethnicity: 154 African American /618 Did Not Report
Intervention	Foot care-specific questionnaire that examined self-foot care practices and knowledge of foot care
Results	On a four point scale, participants scored 2.52 for specialized knowledge
Study	Scollan-Koliopoulos,2004 (9)
Rank/Score	IIA 17/21
Sample	N: 20 Mean Age: Did Not Report Ethnicity: African American
Intervention	Risk factors for amputation questionnaire, amputation beliefs evaluation, and amputation prevention evaluation was conducted to help African Americans prevent diabetes related lower extremity amputations.
Results	Missing doses of medication, skin issues, problems seeing feet, and symptoms of PVD were factors that were not thought to be causal factors of amputations. The factors most often associated with amputation were long term diabetes, high blood glucose levels, and foot deformities. There was unanimous agreement among participants of the need to take more active steps in amputation prevention.
Study	Scollan-Koliopoulos, Walker, & Bleich, 2010 (37)
Rank/Score	IIA 18/21
Sample	N: 70 Mean Age: Ethnicity: 4 Latino/14 African American /48 white/ 4 Asian
Intervention	Questionnaire conducted to examine risk perception fear of amputation, emotional representations of diabetes

Table 3: Continued

Results	Participants that had a positive family history of lower extremity amputation perceived foot issues surrounding poor foot self-care behaviors. There was also a positive association of family history of lower extremity amputation with foot self-care behaviors
Study	Shaya et al., 2007 (45)
Rank/Score	IIA 17/21
Sample	N: 463 Mean Age: Did Not Report Ethnicity: 434 African American / 29 white
Intervention	Diabetes Knowledge Test
Results	Almost 90% of participants conducted daily foot checks only once a week. Of those participants, the diabetes knowledge test score were higher than in those that conducted no foot checks
Study	Vileikyte et al., 2006 (42)
Rank/Score	IIA 15/21
Sample	N: 170 US Mean Age: Did Not Report Ethnicity: Did Not Report
Intervention	Patient interpretation of neuropathy questionnaire was conducted to examine cognitive and emotional representations surrounding the foot care of someone with diabetes related neuropathy.
Results	Scores showed significant association with past foot ulceration and foot self-care behaviors
Study	Willoughby & Burroughs, 2001 (43)
Rank/Score	IIA 18/21
Sample	N: 48 Mean Age: 55 Ethnicity: 37 white/10 African American /1 Latino
Intervention	A 21-item multiple choice questionnaire was administered to determine the presence of foot issues and foot-care behaviors of the participants.
Results	Although almost 70% had a previous foot issue, only around 45% of participants checked their feet on a daily basis. More than half of the participants had a professional foot exam during each clinical encounter. Almost 30% reported going without shoes, and around 10% would not seek professional help for a foot issue.
Study	Evans & Conroy, 2012 (19)

Table 3: Continued

Design	Case Series
Rank/Score	III 17/21
Sample	N: 3 Mean Age: 46.8 Ethnicity: Hispanic, Native American, white
Intervention	Four 90 minute education and skills sessions that included general diabetes knowledge, skills training, foot clinic, and therapy sessions.
Results	Due to the shortage of standard safe housing and insufficient social support, the participants struggled to incorporate lifestyle modifications
Study	Hendricks & Hendricks, 2001 (20)
Design	Cohort
Rank/Score	III 17/21
Sample	N: 40 Mean Age: 62.8 Ethnicity: Did Not Report
Intervention	Joint intervention from a pedorthists and certified diabetes education to assess, educate, and refer patients with at risk lower extremities to the appropriate healthcare provider.
Results	Majority of the participants reported being taught about proper foot care from either a physician, podiatrist, or diabetes educator. Majority of the participants also reported doing daily foot checks. There was a lack of selecting proper shoe gear among the participants that were referred to the pedorthists.
Study	Neil, Knuckey, & Tanenberg, 2003 (21)
Design	Cohort
Rank/Score	III 17/21
Sample	N: 21 Mean Age: 60.5 Ethnicity: 20 African American /1 white
Intervention	Four part intervention that included a foot assessment, foot self-care education, group educational sessions, and shoe gear selection
Results	The experimental group had higher posttest scores compared to the control group.
Study	Plummer & Albert, 1995 (22)
Design	Cohort

Table 3: Continued

Rank/Score	III 17/21
Sample	N: 136 Mean Age: 61 Ethnicity: Did Not Report
Intervention	Participants had foot care skills assessed, and then were examined by health care providers for signs of neuropathy, peripheral vascular disease, ulceration, and other deformities
Results	Probable unsafe foot care behaviors were recognized, showing that standard diabetes care might not provide adequate self-care education
Study	Ward, Metz, Oddone, & Edelman, 1999 (24)
Design	Cohort
Rank/Score	III 17/21
Sample	N: 34 Mean Age: 65 Ethnicity: 14 African American /20 Did Not Report
Intervention	Nurse led foot care intervention given in a 3 month span that included learning skills for a proper foot self-exam, hygiene, shoe gear, and choosing the right health care provider for foot care. Foot care knowledge and health care satisfaction was assessed before and after each session.
Results	The patients that attended each session showed improvements in foot care knowledge. There was also an improvement in satisfaction of professional foot care.
Study	Jordan & Jordan, 2011 (29)
Design	Cross Sectional Analysis
Rank/Score	III 15/21
Sample	N: 118 Mean Age: 65 Ethnicity: Filipino
Intervention	Summary of Diabetes Self-care activities survey was given to examine foot care behaviors of Filipino American women.
Results	Younger Filipino American women with more education, women immigrated to US at an early age, and women who had been diagnosed at a young age reported conducting daily foot checks, as well as proper foot hygiene compared to those Filipino American women diagnosed at later in life.
Study	Patout, Birke, Horswell, Williams, & Cerise, 2000 (23)

Table 3: Continued

Design	Cross Sectional Analysis
Rank/Score	III 18/21
Sample	N: 132 Mean Age: Did Not Report Ethnicity: 84 African American / 48 Did Not Report
Intervention	Outcomes data was gathered and structured interviews were conducted on patients enrolled in the LSU Health Science Center Diabetes Foot Program.
Results	After one year of foot care in the program there was a reduction in hospitalizations, hospital days, ED visits, operations, prescriptions, ulcers days, and amputations compared to the year prior to treatment
Study	Feinglass et al., 2012 (31)
Design	Qualitative Study
Rank/Score	III 13/21
Sample	N: 22 Mean Age: 66 Ethnicity: 11 African American/11 Did Not Report
Intervention	Open and closed ended interviews were done to examine representations of basis of amputation and the coping mechanisms of patients with existing foot and leg issues
Results	Patients reported sudden onset and progression of ulcers, diabetic infections, PVD, foot trauma, and other diabetes related complications. Many reported prior painful treatment for lower extremity complications. Common themes extracted were lack of understanding medical treatments, poor patient provider communication, barriers to health care access, and poor self-management
Study	Parry, Mobley, &Allen, 1996 (33)
Design	Qualitative Study
Rank/Score	III 13/21
Sample	N: 20 Mean Age: 55 Ethnicity: African American
Intervention	Ethnographic inquiry to examine health beliefs and actions of African Americans with type 2 diabetes related plantar ulcers.

Table 3: Continued

Results	Folk knowledge about diabetes and wound care has its roots in Afro-Caribbean tradition. Remedies used have been well known on different continents for over 200 years and can also be found in book stores, health food stores, and libraries.
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Data Synthesis

Thirty-one studies were represented within this review. The interventions included in the studies were general T2DM education (Evans & Conroy, 2012), exercise sessions (Evans & Conroy, 2012), counseling sessions (Evans & Conroy, 2012), referrals to a foot care specialist (Hendricks & Hendricks, 2001), therapeutic foot gear (Hendricks & Hendricks, 2001; Neil, Knuckey, & Tanenberg, 2003), professional foot assessments (Evans & Conroy, 2012; Neil, Knuckey, & Tanenberg, 2003; Patout, Birke, Horswell, Williams, & Cerise, 2000; Plummer & Albert, 1995), foot care education (Batista & Pinzur, 2005; Kruger & Guthrie, 1992; Litzelman et al., 1993; Malone et al., 1989; Neder & Nadash, 2003; Neil, Knuckey, & Tanenberg, 2003; Ward, Metz, Oddone, & Edelman, 1999; Scollan-Koliopoulos, 2004), foot care skills (Kruger & Guthrie, 1992; Ledda, Walker, & Basch, 1997; Litzelman et al., 1993; Plummer & Albert, 1995; Ward, Metz, Oddone, & Edelman, 1999), questionnaires (Corbett, 2003; Jordan & Jordan, 2011), semi-structured interviews (Feinglass et al., 2012; Neil, 2002; Parry, Mobley, & Allen, 1996), videos and pamphlets (Grady, Entin, Entin, & Brunye, 2011; Gravely, Hensley, & Hagood-Thompson, 2011; Malone et al., 1989), and physician reminders (Suico, Marriott, Vinicor, & Litzelman, 1998).

The learning outcomes of the studies were measured by general T2DM knowledge scores (Scollan-Koliopoulos, Walker, & Bleich, 2010), self-care scores (Borges & Oswald, 2008; Bell et al., 2005; Corbett, 2003; Harwell et al., 2001; Johnston et al., 2006), foot care knowledge scores (Jordan & Jordan, 2011; Neder & Nadash, 2003; Neil, 2002; Rajan, Pogach, Tseng, Reiber, & Johnston, 2007; Vileikyte et al., 2006; Willoughby & Burroughs, 2001;), self-efficacy scores (Corbett, 2003; Scollan-Koliopoulos, Walker, & Bleich, 2010), and physician prevention survey scores (Munoz & Chang, 2009). All of the studies that measured foot-care knowledge saw an improvement in health outcomes based on receipt of foot care education. The post –test scores of the control groups were also poorer than post-test scores of the intervention groups, revealing the need of foot care specific education. All the studies that assessed foot care practices noticed an improvement of foot care practices, but not on lower extremity complications. There was a study (Plummer & Albert, 1995) that noted that improvement of practices coupled with foot care education did not reduce the incidence of lower extremity complications in the study participants.

The behavioral outcomes that were assessed in the studies included foot self-exams (Plummer & Albert, 1995; Shaya et al., 2007; Suico, Marriott, Vinicor, & Litzelman, 1998; Ward, Metz, Oddone, & Edelman, 1999), daily foot inspection (Hendricks & Hendricks, 2001; Jordan & Jordan, 2011; Scollan-Koliopoulos, 2004; Suico, Marriott, Vinicor, & Litzelman, 1998), proper footwear (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998), foot washing (Plummer & Albert, 1995; Ward, Metz, Oddone, & Edelman, 1999), visits to a podiatrist (Suico, Marriott, Vinicor,

& Litzelman, 1998), applies moisturizer to dry skin on feet (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998), reports foot problems to a health care professional (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998), wears socks with shoes (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998), avoids soaking feet (Suico, Marriott, Vinicor, & Litzelman, 1998), inspects footwear for foreign objects (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998) like nail points (Suico, Marriott, Vinicor, & Litzelman, 1998), torn lining or rough areas (Suico, Marriott, Vinicor, & Litzelman, 1998), gently files calluses on feet (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998), dries between toes after washing (Jordan & Jordan, 2011; Litzelman et al., 1993), cuts toenails straight across (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998), inspects feet daily for blisters, cuts, and scratches (Suico, Marriott, Vinicor, & Litzelman, 1998), and tests water temperature with hand before immersing feet (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998). Many of the behaviors demonstrated significant improvements were those surrounding daily foot checks (Hendricks & Hendricks, 2001; Plummer & Albert, 1995; Shaya et al., 2007) and proper foot self-exams (Ward, Metz, Oddone, & Edelman, 1999).

The clinical outcomes that were assessed in the studies included hospitalizations (Patout, Birke, Horswell, Williams, & Cerise, 2000), ulcerations (Feinglass et al., 2012; Patout, Birke, Horswell, Williams, & Cerise, 2000; Vileikyte et al., 2006), ER visits (Patout, Birke, Horswell, Williams, & Cerise, 2000), antibiotic treatments (Patout, Birke, Horswell, Williams, & Cerise, 2000), foot operations (Patout, Birke, Horswell,

Williams, & Cerise, 2000), lower extremity amputations (Malone et al., 1989; Patout, Birke, Horswell, Williams, & Cerise, 2000), missed work days (Patout, Birke, Horswell, Williams, & Cerise, 2000), presence of vascular disease (Feinglass et al., 2012), foot trauma (Feinglass et al., 2012), comorbid complications (Feinglass et al., 2012), foot lesions (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998), calluses (Scollan-Koliopoulos, 2004), peripheral vascular disease (Scollan-Koliopoulos, 2004), bunions (Scollan-Koliopoulos, 2004), hammertoes (Scollan-Koliopoulos, 2004), glucose levels (Scollan-Koliopoulos, 2004), dorsalis pedis pulses (Litzelman et al., 1993), posterior tibial pulses (Litzelman et al., 1993), femoral pulses (Litzelman et al., 1993), peripheral neuropathy (Litzelman et al., 1993), dry or cracked skin (Litzelman et al., 1993), ingrown nails (Litzelman et al., 1993), fungal nail infections (Litzelman et al., 1993), fungal skin infections (Litzelman et al., 1993), and interdigital macerations (Litzelman et al., 1993). Many of the clinical outcomes that showed significant improvement in the studies included foot related ulcer days (Patout, Birke, Horswell, Williams, & Cerise, 2000), hospitalizations (Patout, Birke, Horswell, Williams, & Cerise, 2000), hospital days (Patout, Birke, Horswell, Williams, & Cerise, 2000), ER visits (Patout, Birke, Horswell, Williams, & Cerise, 2000), antibiotic prescriptions (Patout, Birke, Horswell, Williams, & Cerise, 2000), foot surgery (Patout, Birke, Horswell, Williams, & Cerise, 2000), lower extremity amputations (Malone et al., 1989; Patout, Birke, Horswell, Williams, & Cerise, 2000), missed work days (Patout, Birke, Horswell, Williams, & Cerise, 2000), ulcerations (Malone et al., 1989), foot lesions (Litzelman et al., 1993; Suico, Marriott, Vinicor, & Litzelman, 1998), cracked skin

(Litzelman et al., 1993), ingrown nails (Litzelman et al., 1993), fungal nails (Litzelman et al., 1993), macerated web spaces (Litzelman et al., 1993), and incidence of neuropathy (Suico, Marriott, Vinicor, & Litzelman, 1998).

Discussion and Conclusions

In this systematic review, foot care interventions were analyzed between 1989 and 2012. 30 studies investigated various foot care interventions that mostly utilized foot care education, professional foot assessments, and foot care skills, although the interventions varied between studies. The learning outcomes assessed in the studies utilized self-care scores, foot care knowledge scores, and self-efficacy scores as they related to foot care. The major behavioral outcomes assessed in the studies were daily foot checks and foot self-exams. The clinical outcomes assessed in the studies varied greatly across the studies, but the most common outcome assessed was presence of ulceration, risk of amputation, or presence of a foot lesion. In the randomized controlled trials, there were no studies that reported improved outcomes in the control group as opposed to the intervention group. Although there were many interventions and health outcomes assessed in the inclusion articles, consistency in the type of intervention was lacking collectively throughout the studies.

Importance of Foot Care Practices on Health Outcomes

Proper foot self-care behaviors can reduce the risk of injury, infection, and amputation in someone with an at-risk foot (Scollan-Koliopoulos, Walker, & Bleich, 2010). Ideal foot self-care behaviors include daily foot and shoe gear checks, proper daily foot hygiene, not walking barefoot, wearing appropriate shoe gear, trimming toenails,

avoiding using anything abrasive on the feet, early professional care for open wound and lesions to the foot, and routine foot exams by professional trained to identify diabetic foot complications (Jordan & Jordan, 2011). T2DM health care providers strongly encourage patients to implement these foot self-care practices (Matricciani & Jones, 2015). Previous studies have found an increase in foot ulcers and amputations in those patients that have not adopted these practices (Shaya et al., 2007).

Importance of Foot Care Education Interventions on Health Outcomes

Foot injuries and ulceration have been associated with poor T2DM related foot care knowledge and foot self-care skills (Jordan & Jordan, 2011). This lack of knowledge has been recognized as a contributing factor to why people with T2DM do not undertake foot self-care practices (Harvey & Lawson, 2009). It is widely accepted that additional education will lead to improved knowledge, self-care behaviors, and reduction of foot complications (Matricciani & Jones, 2015). Funnel et al (2009) noted that this additional education should be tailored to the individual needs and beliefs of the person with T2DM. There are studies that have shown a clear reduction in amputation rates following a foot care intervention (Barth, Campbell, Allen, Jupp, & Chisholm, 1990). Litzelman et al (1993) found that along with the implementation of a self-care contract, there was a sizable improvement in foot self-care behaviors as compared to standard care.

Importance of Overall Self-care Management on Health Outcomes

DSME has been shown to be the foundation of care for anyone with T2DM wanting to improve disease related health outcomes (Mensing et al., 2002). DSME is an

essential component in the prevention of T2DM related complications, but also provides disease prevention for those with pre T2DM (Haas et al., 2012). Patients that are not offered DSME have a fourfold risk of developing T2DM related complications are compared with those that have had some form of DSME (Suhl & Bonsignore, 2006). Studies have shown that these educational interventions have the ability to lower rates of lower extremity amputations by up to 85% (Ollendorf et al., 1998). DSME is effective controlling illness and improving health, and is accepted as a cost-effective strategy (Boren, Fitzner, Panhalker, & Specker, 2009). Ollendorf and colleagues (1998) noted that educational interventions aimed at foot self-care behavior and skills may offer the highest economic benefit in the reduction of lower extremity amputation rates.

Strengths and Limitations

This systematic literature review is a comprehensive examination of foot self-care knowledge and practice interventions conducted within the United States, solely on individuals with type 2 diabetes. This review provides an important insight into an area of type 2 diabetes management and care that has been ignored by research studies and interventions. The studies included within this systematic literature review provides evidence of improved health outcomes, learning outcomes, and behavioral outcomes, and how those outcomes ultimately improve quality of life for those with type 2 diabetes. The limitations of this review were that it only analyzed studies within the United States and those studies only examined foot care knowledge and foot care practices in the actual population that lives with type 2 diabetes. The systematic review

also did not include studies that examined foot care knowledge and foot care practices of the care givers or health care providers.

Future Research

Future research should examine the effects of a standardized foot self-care program across multiple populations and intervention sites that focus on the reduction of complications associated with a type 2 diabetes diagnosis. This potential intervention has the ability to expand the scope of DSME to not only include foot care, but to include other complications associated with this condition.

CHAPTER III
COMMON SENSE REPRESENTATIONS OF ILLNESS IN AFRICAN AMERICANS
WITH TYPE 2 DIABETES

Introduction

A 59 year-old man living with type 2 diabetes (T2DM) with a history of lower extremity complication with no history of participating in a diabetes education class described managing his diabetes diagnosis as follows:

“Honestly, not as confident as I should be because one of the things I discovered early on is that diabetes can be so frustrating at times. That you are doing everything that doctors are tell you to do, you’re eating like you’re supposed to, your exercising like you’re supposed to, your taking your medication like you’re supposed to, and your sugar still goes up instead of down. ”

In the United States, the incidence of type 2 diabetes (T2DM) continues to increase. T2DM has affected approximately 25.8 million people in the US population (Appiah et al., 2013). African Americans (AA) bear a disproportionate burden of T2DM (Baptiste-Roberts et al., 2007). Scollan-Koliopoulos (2004) noted that in AA populations, the most alarming complication has been lower extremity amputations. As AA get older, they are more likely to undergo a major lower extremity amputation, compared to whites (Feinglass, Abadin, Thompson, & Pearce, 2008). The lower extremity amputation rate of T2DM was 3.9 per 1,000 among people under age 65, 6.6 per 1,000 among people age

65-74, and 7.9 per 1,000 among people age 75 and older (Amputee Coalition of America, 2012). Survival rates post T2DM related amputations are estimated to be 11-41% one year post amputation, 50% three years post amputation, and as great as 69% five years following a lower extremity amputation (Scollan-Koliopoulos, 2004). The implementation of foot related self-care and knowledge within diabetes self-management education (DSME) may aid in the improvement of poor health outcomes associated with T2DM related amputations.

Diabetes Self-Management Education has been shown to “cornerstone of care” in diabetics that want to improve diabetes related health outcomes (Mensing et al., 2002). DSME is imperative to those not only with prediabetes, but also aids in preventing or delaying diabetes related complications in people who already are living with this condition (Haas et al., 2013). In a study conducted by Chlebowy and colleagues (2010), one of the most important factors that impacted adherence to self-care management plans was family support (Chlebowy, Hood, & LaJoie, 2013). In another study, AA belief in God played a major role in how AA adhered to their individual T2DM self-care management plans (Devlin, Roberts, Okaya, & Xiong, 2006). Although, there are national standards for DSME, there are no specific guidelines as to how DSME should be utilized as part of a persons’ T2DM related care (Tibbetts, 2006). With no clear direction for DSME, minority populations that have traditionally had poorer health outcomes will continue to follow that same trend.

In the Self-Regulation Model of Illness Representations, people are thought to be functioning problem solvers, and their behavior should be the by-product of that

rationale (Leventhal, Leventhal, & Cameron, 2001). Self-regulation has been described by Zeidner and colleagues (2000) as organized behavior that involves setting personal goals and making strides in achieving those goals. Leventhal and colleagues (1980) suggested two parallel pathways to explain how illness can occur, (1) subjective and (2) objective, with both pathways being composed of three parts: a) cognitive/emotional representation, b) coping, and c) appraisal. The components that comprise the cognitive representations of illness include: disease identity, consequences, timeline, cause, and controllability (Watkins et al., 2000). These cognitive representations offer the person the opportunity to gather information about an illness, and influence how the person monitors any symptoms, actions, and consequences of that illness (Watkins et al., 2000).

Understanding how AA cognitively represents T2DM can facilitate adherence to self-care management regimens, compliance to prescribed treatment and medication plans, and positive health outcomes. There have been very few T2DM studies that have examined the role of cognitive representations of illness in the context of a theoretical framework (Fisher et al., 1998). There are fewer studies that associate the lack of self-management education with cognitive representations of illness. This study proposes to show how the lack of knowledge and education surrounding a T2DM diagnosis prohibits the person from organizing illness information and ultimately monitoring symptoms, actions, and consequences of uncontrolled T2DM. This exploratory study sought to understand individual cognitive representations of diabetes management and their association with potential lower extremity complications.

Background

Diabetes mellitus is “a syndrome of relative or actual insulin deficiency exhibited by either the lack of insulin production or the ineffective use of insulin” (Scollan-Koliopoulos, 2004, p.126). Scollan-Koliopoulos (2004) went on to note that T2DM makes up around 95% of cases between the two main types of diabetes, and affects AA at alarming rates (Scollan-Koliopoulos, 2004). In the United States, the rates of T2DM continue to rise. Roughly 24 million people have been diagnosed with this condition, including over 10% of individuals that are just over 20 years of age (Melkus et al., 2010). T2DM has been shown to disproportionately affect AA including morbidity, amputation, and mortality rates associated with this condition (Scollan-Koliopoulos, 2004). The consequences surrounding T2DM related amputations greatly restrict that person’s quality of life (Scollan-Koliopoulos, 2004). It has been shown that peripheral neuropathy and peripheral vascular disease often accompanies diabetic related infections of the lower extremity, ultimately leading the person to having an at-risk lower limb (Scollan-Koliopoulos, 2004). Compromised wound healing, along with nerve damage and ulceration, has been long thought to be the root causes of lower extremity amputations (Lavery, Armstrong, Wunderlich, Tredwell, & Boulton, 2003). Survival rates following diabetes related amputations have been shown to be as high as almost 70% post amputation (Scollan-Koliopoulos, 2004). It is possible to use diabetes related knowledge and foot care skills initiative to achieve the Healthy People 2020 objective of reducing the disease related complications and mortality that surround a type 2 diabetes diagnosis (Scollan-Koliopoulos, 2004). The disparity in health and health care access

should be taken into complete consideration during the design of interventions to improve health outcomes for African Americans (Melkus et al., 2010). Experts have advocated for more comprehensive interventions to assist a person with the multifaceted challenges of self-management (Melkus et al., 2010). Despite accredited self-care management programs being implemented in various health care settings, minority utilization of those programs is low (Melkus et al., 2010). Although there is overall agreement that self-care management plays an integral part of managing any chronic illness, little is known about those self-care skills of chronically ill African Americans (Becker, Gates, & Newsome, 2004).

Methods

Phenomenological Methodology

Phenomenology places an emphasis on awareness and the content of a mindful experience, such as judgments, perceptions, and emotions (Balls, 2009). This methodology was utilized because the researcher wanted to use the interviews to capture the essence of the participant experiences with T2DM. Carpenter (1999) noted that an individual's lived experience represents an authentic experience that is a significant part of the individual's viewpoint of a particular phenomenon. Bracketing is used in phenomenology to separate independent beliefs, feelings, and perceptions to be more accepting to the phenomenon in question (Streubert & Carpenter, 1999). Bracketing was utilized by the primary researcher to ensure the validity of the data collection and analysis (Speziale & Carpenter, 2007). As a podiatrist and a researcher of

persons with T2DM, it was imperative that the interviewer acknowledge and bracket those experiences. No participant had been a patient of the interviewer.

Participants

A purposive sample of 8 AA women and 4 AA men with T2DM participated in this phenomenological study. The average age was 58 years old, with only one participant that was single. All the participants had health insurance coverage, and reported visiting the doctor at least 4 times a year. The average number of years diagnosed with T2DM was 12.8 (Table 4). Although each participant had a family history of T2DM, only one had been to a formal DSME class.

Procedure

Following approval from the Institutional Review Board, participants that met the inclusion criteria were recruited for this study. All participants were recruited through word of mouth or by flyers used as recruitment tools for the study. Only participants that self-identified as being AA, having T2DM, and being over the age of 18 were included in the study. Semi-structured, face-to-face interviews were conducted over 4 months by the primary author. All interviews were conducted in a place chosen by the participant, and lasted between 20 and 120 minutes. Prior to the study, the interview guide was developed using self-care management, as well as foot care patient education literature. The primary author collaborated with a primary care physician, a podiatrist, and a chronic disease researcher to finalize the topics discussed during the interview. The interviews consisted of questions relating to diet, exercise, basic diabetes

foot care, lower extremity disease acquisition knowledge, patient/provider communication, and confidence in management of the diagnosis (Figure 2).

Table 4: Summary of Participant Demographics

	N (%)
Age Range	
18-39	1 (8.3)
40-54	2 (16.7)
55-64	4 (33.3)
65-older	5 (41.7)
Marital Status	
Single	1 (8.3)
Married	11 (91.7)
Education Level	
High School	4 (33.3)
Technical Degree	1 (8.3)
Bachelor's Degree	2 (16.6)
Professional Degree	5 (41.7)
Duration of T2DM	
1-5 yrs	2 (16.7)
6-10 yrs	6 (50)
>20 yrs	4 (33.3)
Attended DSME	
Yes	1 (8.3)
No	11 (91.7)

Figure 2: Semi-Structured Interview Script

Script for Semi-Structured Interview with Participants

1. Introduce myself
2. Explain the goals and aims of the study, and what I hope to gain from this research study
3. Explain the interview protocol
4. Give Consent
5. Demographic Profile
6. Explain how lower extremity disease is described as for this study
7. Begin interview
 - a. Please tell me a little about yourself
 - b. Self-Care Practices**
 - i. Diet
 1. Please describe your eating habits
 2. What do you consider to be a healthy diet for a type 2 diabetic?
 - ii. Exercise
 1. Please describe your current exercise regimen
 2. What would you describe as a good exercise regimen for a type 2 diabetic?
 - iii. Medications
 1. Do you take oral medication or insulin?
 2. Please explain how you take your T2DM medication.
 3. How often did your health care provider advise you to take you medication?
 4. How often do you check your blood sugar?
 5. Do you know what your HbA1c is?
 - iv. Smoking
 1. What has your health care provider told you about how smoking relates to T2DM?
 - c. Lower Extremity Disease Knowledge**
 - i. How would you describe basic diabetic foot care?
 - ii. Please describe what leads type 2 diabetics to develop poor blood flow to the feet?
 1. Has your health care provider explained to you how poor blood flow affects your feet?
 2. Have you ever had an exam referred to as Ankle/Brachial Index or Doppler?
 3. What did your health care provider explain to you as the meaning for those exams?

Figure 2: Continued

1. Please explain how you obtained knowledge about poor blood flow to your feet.
 - iii. Please describe what leads type 2 diabetics to develop poor nerve sensation to the feet.
 1. Has your health care provider explained to you how poor nerve sensation affects your feet?
 2. Have you ever had a foot exam that included a thin piece of plastic referred to as a monofilament?
 3. What did your health care provider explain to you as the reason for needing this exam?
 4. Please explain how you obtained knowledge about poor nerve sensation to your feet.
 - iv. Please describe how you think type 2 diabetics develop diabetic foot infections.
 1. Has your health care provider explained to you how a type 2 diabetic develops diabetic foot infections?
- d. Self-Efficacy/Patient Activation**
- i. How do you manage your type 2 diabetes?
 - ii. Please explain any issues with your feet that you have encountered in the last five years.
 - iii. Has your health care provider explained to you how to manage those issues?
 1. Please describe how your health care provider explained how to manage those issues?
 2. Please explain how confident you feel managing this issue in case of an emergency?

Interviews were transcribed verbatim. Data saturation was determined by consensus between the main researcher and another qualitative research expert.

Data Analysis

The use of narrative analysis aids in the investigation of life experiences of individuals with T2DM (Sherman, Jones-McKyer, Singer, Larke, & Guidry, 2014). Understanding the lived experience remains central to capturing what the individual is truly living through (Moustakas, 1990). The semi-structured interviews allowed each

participant to discuss T2DM and lower extremity disease in their own terms. The resulting excerpts from the interviews were not edited or corrected, and represent each participant's unique experience with this condition.

Themes and patterns were flushed out, both during and after data collection. Following transcription of each interview, the primary investigator performed several rounds of active listening. The analyses included field notes of personal ideas and observations by the primary investigator, as well as theoretical notes of the relevant ideas and concepts. The primary investigator then flushed out the significant statements within each interview, which was instrumental in the development of the codes. The codes were then aggregated into themes. More specifically, data extracts were arranged according to how the semi-structured interview guide was constructed.

Results

The 12 verbatim transcripts yielded several topics; three of the major themes that were flushed from the interviews were:

Basic foot care knowledge

Lower extremity disease knowledge

Patient provider communication

Basic Foot Care Knowledge

Hospital admissions due to foot issues are more prevalent than for any other long term complication in those living with T2DM (Boulton, 2015). Nail care, foot hygiene, and foot gear selection are all pieces of general advice that should be given to those without foot issues as preventive measures (Boulton, 2015). The participants in this

study were very cautious with the hygiene of their feet, especially having clean feet.

One participant described basic diabetic foot care as the following:

I try to take good care of my feet. When I have to shower I definitely wash between my toes real good and all that and if anything ever happens, I put an ointment if I get a little cut or something while I'm outside in the yard or something.'

Likewise:

'Everything I've done for my foot care has been through me and my wife. I used to go get pedicures and then my wife encouraged me to stop doing that because she said that an increased amount of infection can go to my feet by me doing that and going to get pedicures and that I need to go to a certain type of pedicure person to get a diabetic pedicure. So now she cuts my toenails for me every month and she doesn't go too far back, and she gives me a pedicure once a month.'

Another participant described basic diabetic foot care in these terms:

'Keep my feet clean, keep them moist, keep them dry between the toes, and go to a podiatrist to get my nails cut.'

Most of the participants associated basic foot care with hygiene, but one participant made the direct association between glucose levels and foot complications:

'And I think you should try to keep up with what your blood sugar is saying and doing and watch what you eat, that's basically what I think.'

Lower Extremity Disease Knowledge

In this study, the researchers used the term LED, which is defined as a “chronic, disabling disease that negatively influences the quality of life of particularly the elderly and diabetic populations” (NHANES, Lower Extremity Disease Procedures Manual, 2004). This manual noted that increasing the disease associated knowledge of anyone with the risk factors for LED may aid in the prevention of disabling complications of T2DM (NHANES, Lower Extremity Disease Procedures Manual, 2004). Due to the fact that T2DM is one of the major causes of LED, both conditions are associated with limited mobility, decreased quality of life, and increased medical expenses (Dorsey, Eberhardt, Gregg, & Geiss, 2009). When the participants were asked about the development of poor blood flow to their feet, many of the responses were lifestyle related:

Not taking care of themselves, not exercising. That keeps your limbs active, keeps your blood flowing like it should. There are times that I have the swelling, but that from my blood pressure medication, so that's why I walk. And when I walk, the swelling goes down and that's one of the signs of diabetes. So things like that. Poor health habits, meaning you don't go to the doctor; you don't get your A1cs every 3 months like you're supposed to.'

Likewise another participant made a similar assessment:

'Laziness? Laziness. I experienced when I used to run a lot and I noticed the difference that what my blood flow was when I ran a lot to when I didn't run a lot.'

Another component of LED the participants were asked about was the development of poor nerve sensation to the feet, and lifestyle behaviors such as exercising remained a focal point. Many of the participants also continued to group circulation issues with neuropathic issues in the foot:

'I think that again has to do with not exercising because your body has to move in order to make the blood circulate. If you're sitting still and you're not moving and basically doing nothing, sitting up watching tv in the bed.'

Another participant gave a similar response to the question:

'Probably had a lot to do with the circulation, the blood, who knows? I'm thinking it has to do the same thing as far as the bloods been able to go to that area.'

Patients with diabetes are particularly susceptible to foot infection primarily because of neuropathy, vascular insufficiency, and diminished neutrophil function (Bader, 2008, p. 71). Because of the vascular and neuropathic connection to diabetic foot infections, the participants were asked questions about how diabetics develop foot infections. Many of the responses go back to hygiene, particularly maintaining clean feet. That association can be seen with many participants' responses, including:

'For one thing, you have to really be very very clean. Like I said especially when you are doing pedicures, you got make sure that they are using clean sterile instruments. Then sometimes, another problem is how some people think they can do home remedies, and they infect it much worse and then when you get to the doctor, its going to be hard. And a lot of it is self-inflicted because we think we are our own doctors.'

Another participant stated:

'Like I said, I make sure to clean them real good. I try not to ignore anything when it comes to my health and well-being.'

One participant made the connection of diabetic foot infections being caused by untreated breaks in the skin:

'I think from cuts or scratches that you try to take care of yourself or cutting the nails yourself and they become ingrown.'

Another participant made the connection between having poor vascular status and diabetic foot infections:

'Well to me, I think that part of it is poor circulation would be more of the issues. Poor circulation through the veins and things of that nature, not knowing that anything is going on.'

Patient Provider Communication

Patients and health care providers must work hand in hand to achieve optimal self-management of a condition such as T2DM (Heisler et al., 2003). Patient centered communication can have a huge impact on an individual's self-care behaviors, but can

also improve T2Dm related health outcomes (Heisler, Cole, Weir, Kerr, & Hayward, 2007). To help improve self-care behaviors, a “paradigm shift” has been issued by chronic disease experts that take the clinical encounter from directive to a more patient inclusive (Heisler, Bouknight, Hayward, Smith, & Kerr, 2002). Throughout the participant interviews, many of the participants noted difficulties in understanding their health care providers or not receiving enough information about their current health status:

‘They just give me this piece of paper, take 10 minutes, go to the hospital and get things done. I don't even understand what it is that they want when they call me and say everything is normal. I'm like, "what is normal, what are you talking about, what did they do to me?" All I know is they took some blood, 5 finger blood, and put it in something and now you're calling me telling me it's something normal. Tell me what you're talking about!’

Oftentimes during the interview, the participants seemed to completely trust the health care provider even though they lacked the understanding of how T2DM can cause potential lower extremity complications:

‘When I started going to the doctor, this man [health care provider] did all sorts of things, and he was always concerned about your feeling, but I don't know anything that he did. He did a lot of tests and stuff that would have prevented me from losing the limb. I don't know any kind of test and

I don't know any medication or anything that was done, so it just seem like going to him [health care provider] was to help me.'

With lower extremity complications being one of the most devastating and life altering complications associated with T2DM, some participants admitted not getting adequate information on the importance of foot care:

'I was never given instructions about taking care of my feet, I didn't know I had a problem with my feet to be honest.'

Likewise, another participant stated:

'The only thing she said was to keep my sugar low and exercise.'

Discussion

In this study of AA living with T2DM, the majority had no understanding of basic diabetic foot care or of how lower extremity complications can result from a diabetes diagnosis. Instead, the general perception of the acquisition of lower extremity complications was that they were related to how clean the participants kept their feet. Only those participants that had a family member or friend to suffer from lower extremity complications had a better understanding of how uncontrolled diabetes or an unhealed break in the skin would potentially cause lower extremity problems. Although many of the participants recognized the descriptions of different exams used to detect potential lower extremity issues, majority were unfamiliar with what the exams were performed for. Most participants did not have foot care practices that were potentially problematic, but there was general lack of communication between the participants and

their health care providers. Only one participant had participated in a DSME class, although all participants had been living with T2DM a considerable amount of time.

For those that have T2DM, majority of their time is spent outside the clinical encounter. Even if the health care provider is knowledgeable and diligent during the encounter, a transfer of knowledge is needed from the professional to the patient to ensure the patient has the basic capabilities to manage their condition away from the health care professional. The lack of basic foot care knowledge, as well as LED knowledge, could be resolved through DSME or foot specific interventions focusing on this population. These interventions have the ability to provide the education element and tools needed to not only manage the diagnosis, as well as instill confidence to be active participants in how the condition is managed. There have been very few studies that assess the knowledge associated with lower extremity complications not only in the AA population, but in all populations. Studies have been conducted to understand barriers to self-care management and perceptions of patient provider relationships. This particular study, to the author's knowledge, is the first qualitative study that allowed participants with T2DM to give detailed accounts of what they understood about the acquisition of lower extremity complications as well as detailed accounts of any education that had been provided to them about lower extremity complications, whether or not they suffered from such a complication.

Gale and colleagues (2008) conducted a study that concluded with the participants not knowing what a foot ulcer was, or how a foot ulcer is treated. Barth and colleagues (1991) found that in the patients that had extensive foot care education, there

was a substantial improvement in foot care knowledge as compared to a control group. To date, there have been very few studies conducted detailing how effective T2DM related foot care interventions are (Shaya et al., 2007); the current study lends its support that increasing LED knowledge does enhance foot care practices.

Theoretical Propositions

The Self-regulatory Model of Illness Representations was designed to explain how the combination of a health threat coupled with an action plan resulted in how a person monitored a particular health concern (Diefenback & Leventhal, 1996). The action plan in this study was self-care management of T2DM and foot self-care management. Self-care management strategies include an individual's methods of keeping T2DM and its numerous complications under control (Clark, Gong, & Kaciroti, 2014). The participants in this study had common sense assumptions of T2DM that were the reflection of their personal experiences in having a T2DM diagnosis. Self-regulation is very individualized, and encompasses specific skills that are used to reach a certain goal and solve a specific problem within the context of an illness (Clark, Gong, & Kaciroti, 2014).

Three themes were identified that focused on essential aspects of proper foot self-care management. The basic foot care knowledge theme involved the participants linking the prospect of having clean feet with the reality of having healthy feet. The lower extremity disease knowledge theme focused on the lack of understanding of how lower extremity complications can arise from a T2DM diagnosis. The patient provider communication theme reflected the need for more patient centered T2DM related

conversation, as well as referrals to self-care management programs at all stages of the condition. This qualitative inquiry expands on prior research on self-regulation, noting that improving illness perceptions in those individuals with poorly controlled diabetes can greatly improve health outcomes (Keogh et al., 2007).

Strengths and Limitations

The strength of this exploratory study was the ability to capture the participants' views on what they actually understood about T2DM and its devastating lower extremity effects. This study was able to show that in order to make common assumptions of LED; baseline knowledge of LED complications is needed. An additional strength is the methodology used to understand this phenomenon. At the time of this study, there were very few studies that give a personal account of the daily foot care practices and the knowledge assessment of AA living with T2DM. This study adds to that growing body of knowledge but also provides insight to where interventions can be developed to help improve health outcomes for AA.

There are limitations to this study. The data stems from individual semi-structured interviews of 12 participants from a similar geographic location, and these findings cannot be generalized. More research, using a larger sample, could have added richness to the data. Given the lack of research on the actual knowledge and practices of this population, the study still provides important insights on this phenomenon. DSME has been recognized as an essential component of effective glycemic control and self-management, and is key to achieving optimal health outcomes, but AA participation is low. The goal of this exploratory study was to bring attention to a lack of lower

extremity education, and education as a whole, delivered to AA living with T2DM. Not only was a lack of education highlighted, but also a lack of communication with health care providers was also shown, as well. DSME was developed to give individuals with this condition the tools needed to be active participants in their individual health care, improve health outcomes, prevent complications, and prevent spread of disease complications (McCleary-Jones, 2010). It can only be hypothesized that those that have not participated in DSME programs lack those above mentioned tools. This study sought to examine how a lack of knowledge surrounding lower extremity complications of T2DM could negatively impact perceptions of lower extremity complications. Further research is needed to investigate illness perceptions of T2DM in greater detail, including more self-care components, not just that surrounding lower extremity disease.

CHAPTER IV
FOOT CARE KNOWLEDGE AND FOOT SELF-CARE AMONG AFRICAN
AMERICANS LIVING WITH TYPE 2 DIABETES

Introduction

Type 2 diabetes (T2DM) affects around 8% of the US population, but has a disproportionate burden on racial and ethnic minorities (Olson, Hogan, Pogach, Rajan, Raugi & Reiber, 2009). Although T2DM is characterized by its various complications, lower extremity ulcerations are some of the most well-known (Wu, Driver, Wrobel, & Armstrong, 2007). Repetitive micro trauma and injury, resulting in tissue breakdown, often precede T2DM related amputations (Pollock, Unwin, & Connolly, 2004). A diabetic has around 46 times the chance of amputation as someone without the condition, and has as low as a 27% survival rate five years post amputation (Corbett, 2003). In spite of receiving T2DM related education, there are still reports of improper foot care practices, including ill-fitting shoe gear, inappropriate nail care, and walking around without shoes (Corbett, 2003). T2DM related complications can be reduced through comprehensive foot self-care interventions, which studies have shown reduce amputations rates by up to 85% (Neder & Nadash, 2003).

The disparities that lie in lower extremity amputation rate has been well documented in the literature, especially those that have suffered from amputations due to peripheral vascular disease and T2DM (Lefebvre & Lavery, 2011). African Americans (AA) have higher rates of T2DM and associated complications, such as retinopathy, end

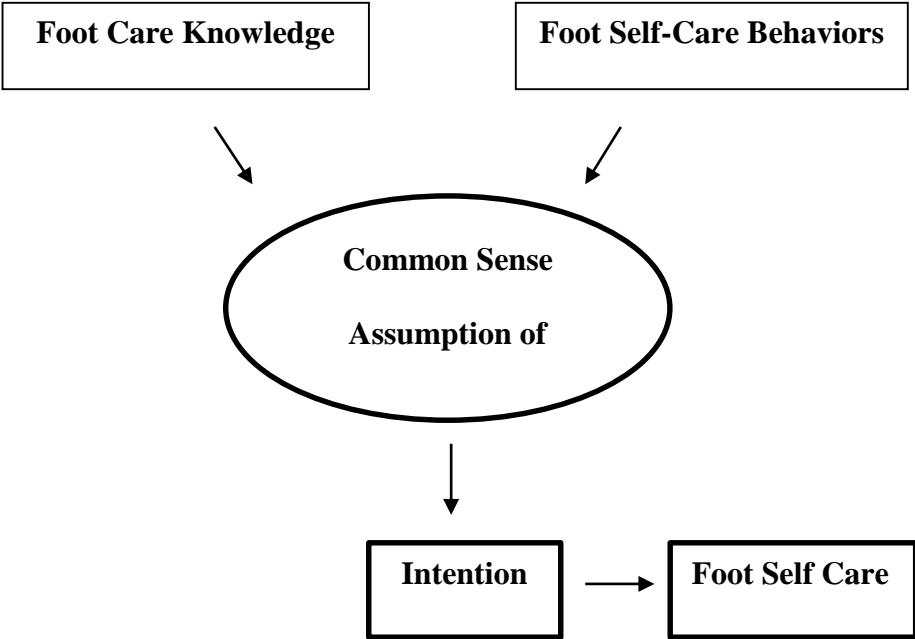
stage renal disease, and lower extremity amputation (Peek, et al., 2010). Lower extremities amputations have been shown to pose serious implications are not only those suffering with the amputation, but also their family members and caretakers (Scollan-Koliopoulos, 2004). Any interventions that are developed to improve T2DM related health outcomes of AA should be designed with consideration of the extensive factors that contribute to this health disparity (Scollan-Koliopoulos, 2004).

The most successful means of reducing rates of lower extremity ulcers and amputation is through foot care education (Corbett, 2003). The American Diabetes Association has acknowledged how essential foot care education is to patient education (Kruger & Guthrie 1992). Efficient foot care interventions can prevent or reduce morbidity and disability in those with T2DM (Neder & Nadash, 2003). Studies have shown that foot care interventions reduce T2DM associated amputation rates between 44% and 85% (Barth, Campbell, Allen, Jupp, & Chisholm, 1991). Although there is evidence of the reduction of ulceration and lower extremity amputations through multifaceted treatments, extensive implementation of these types of interventions has not been achieved (Lavery, Peters, & Armstrong, 2008).

The model (Figure 3) that was employed was one that was developed for the purpose of this study. This study builds on foot self-care behaviors, foot self-care knowledge, and barriers to adequate foot care, but also incorporates the common sense assumption of severity. A common sense assumption of lower extremity disease (LED) severity was a concept that was utilized from the self-regulatory model of illness representations. These common sense assumptions permit a person organize known

information about their illness, but also shapes how they monitor symptoms, participate in self-care, and deal with illness related consequences (Watkins, 2000). The common sense assumption of LED severity directly influences the participants' long term intention of using the above mentioned tools to prevent lower extremity disease.

Figure 3: Conceptual Model



The proposed model assumes that a person's intention to have long term foot care is impacted by his/her (1) behavioral beliefs about foot self-care, (2) the knowledge obtained about proper foot self-care, and (3) the barriers that may be present to having or performing adequate foot self-care. In order to examine this relationship, this model would be best tested in the context of a foot care intervention to determine actual foot

self-care. For this study, the model was used to study how the relationship that self-reported foot care knowledge, foot self-care behaviors, and any barriers that may prevent adopting effective foot care had on a participants' intention to maintain long term foot self-care.

Methods

Sample

A convenience and snowball sampling plan was used to recruit African Americans via a third party online survey engine (Qualtrics, Provo, Utah) as well as telephone, email and flyers detailing the study. Inclusion criteria for the study consisted of men and women (a) over 18 years old, (b) who self-described as African American, (c) who had previously been diagnosed with type 2 diabetes, and (d) were able to speak and understand the English language. Study protocol was approved by the Institutional Review Board (IRB) at Texas A&M University.

Measures

The foot care knowledge questionnaire was modified from an existing, previously utilized instrument whose development is described in detail in Johnston et al., 2006. For the purpose of the current study, we eliminated the items specific to the Veterans Administration context. The SF-36 as well as the Medical Outcomes study were utilized for the questions regarding health transitions, physical function, and overall health (Stewart et al., 1994). The questions regarding foot risk factors, self-care behaviors, and education were taken from two instruments, the Diabetes Patient Outcome Research Team Survey (NDEP, 2003) and the VA's Diabetes Quality

Improvement Project Survey (Johnston et al., 2006). The final version of the questionnaire was reviewed by the members of the research team and consultants, and covered demographic information, general health, diabetes education, and foot self-care information (Johnston et al., 2006).

Johnston et al (2006) performed scaling analyses to ensure the questionnaire's reliability and internal validity. There were six subscales recognized through principles components analysis: 1) basic foot care education, 2) extensive foot care education, 3) basic professional foot care, 4) extensive professional foot care, 5) basic foot self-care, and 6) extensive foot self-care ($\alpha = 0.77-0.91$). There were probing questions inserted throughout the questionnaire on any barriers to foot self-care, professional foot care delivery, specialized shoe gear, and foot care satisfaction (Olson et al., 2009). For the purposes of the current study, the questionnaire was pilot tested with a small convenience sample of 12 participants (aged 21-50). Following the pilot testing were cognitive interviews of the participants which allowed the primary researcher to gather input from the participants as they completed the survey in real time. Major input was given on how user friendly the survey was, if the skip patterns performed as planned, and if the wording of specific questions were able to effectively communicate the meaning of the questions or be modified to do so.

Data Collection Protocol

Data were collected using both the online assistance of Qualtrics as well as hard copies of the survey. The both versions of the questionnaire included an introduction sheet that stated that participation was completely voluntary, and that the survey was

intended to take approximately 25 minutes to complete. Following the introduction sheet, the participants were advised to select yes or no in regards to giving consent to participate in this research study.

Data Analysis

The data from both versions of the survey were imported into SPSS. Descriptive analysis and analysis of variance was employed to analyze basic foot care knowledge, specialized foot care knowledge, and foot self-care within the participants. The data was also divided by (a) whether the participant had insurance, (b) education level, and (c) gender to test for any potential moderating effects.

Results

115 participants recruited for the study, 95 participants completed the questionnaire for a response rate of 82.6%. However, not all participants answered all questions. Of the participants, 56.8% of the participants were women, 52.6% of the participants were over the age of 65, with 21.1% of the participants having a type 2 diabetes diagnosis between 6 and 10 years. Table 5 describes the health descriptors related to the study. When asked to rate their general health, 24.7% of participants self-described their health as fair/poor, 63.4% reported that their health over the last year is the same or has worsened. When the participants were asked to report if they had any complications or comorbid conditions, 11.6% of participants reported being told by a doctor or nurse that they were depressed. When the participants were asked if they were affected by any other illnesses or lower extremity complications, 27.4% reported that they suffered from problems with circulation. When asked if they had any of symptoms

or problems related to peripheral neuropathy, 52.2% reported numbness in the feet, 61.3% reported tingling sensations in the feet, and 37.7% reported burning pains in their feet.

Table 5: Health Descriptors

	%
Health Indicators	
General health (fair/poor)	24.7
Health compared to last year (same/worse)	63.4
General Health and Comorbid Conditions	
Heart Attack	2.1
Congestive Heart Failure	3.2
Previous Peripheral Bypass	4.2
History of Depression	11.6
Illness Burden and Foot Risk Indicators	
Nerve Damage in feet or legs	18.9
Problems with Circulation in legs	27.4
Ulcers in the last year	7.4
Lower limb amputation	7.4
Neuropathy Symptoms (Always/Sometimes)	
Numbness in feet	52.2
Tingling sensation in feet	61.3
Burning pain in feet	37.7

Frequencies were reported for patient foot care knowledge and patient foot self-care in Table 6. The items were grouped according to the scaling analysis conducted by the developers of the questionnaire. The responses for foot self-care were scored from 1 (daily) to 5 (not at all), and the responses for foot care knowledge were scored from 1 (nothing at all) to 4 (enough). Of the foot self-care domains, 62.5% of participants reported trimming their own nails, while only 16.1% participants reported testing water

temperature before putting feet in water. The mean score of $2.63 \pm .92$ for basic foot care indicates that the participants did these activities between once a week to several times a week. The means score of $3.59 \pm .54$ for the extended foot care indicates that the participants did these activities between once a week to once or twice a month. Of the foot care knowledge domains, 51.6% of participants reported being given enough education on how to properly keep their feet clean, but only 19.6% reported getting enough education on using a mirror to see the bottom of feet. The mean score of 2.88 ± 1.02 for basic foot care education indicates that the participants felt like they had been taught nothing at all to very little about basic foot care education. The mean score of $2.46 \pm .99$ indicates that the participants also had been taught nothing at all to very little about extended foot care education.

Table 6: Participant Reports on Foot Self-Care and Foot Care Knowledge

Foot Care Domain and Associate Question	Factor	%
Foot Self-Care: In the past 4 weeks, how often have you: (% in participants that endorsed >1/week)	Basic	
	Looked at bottom of feet	33.4
	Checked between toes	29.0
	Tested water temperature	16.1
	Dried between toes	16.3
	Checked shoes	16.5
	Mean \pm SD	$2.63 \pm .92$
	Extended	
	Soaked feet 10 min	20.4
	Used lubricants on feet	18.4
	Filed own calluses	21.1
	Trimmed own nails	62.5
	Mean \pm SD	$3.59 \pm .54$

Table 6: Continued

Foot Care Domain and Associate Question	Factor	%
Foot Care Education: How much have you been taught about: (% of participants that reported enough education)	Basic	
	Check feet regularly	41.9
	Keeping feet clean	51.6
	Choosing proper shoes	36.6
	Always wearing	44.1
	shoes/slippers	46.2
	Keeping skin moist	2.88 ±
	Mean ± SD	1.02
	Extended	
	Use mirror to see bottom of	19.6
	feet	37.0
	Avoid very hot and very cold	26.4
	Gently filling calluses	28.3
	Cutting nails	40.0
	Cutting corns or calluses	29.7
	Not using drugstore chemical	37.4
When to call	47.8	
Whom to call	2.46 ± .99	
Mean ± SD		

A one-way analysis of variance was conducted to evaluate the relationships between participant gender, insurance status, and education level with basic and extended foot care knowledge and basic and extended foot self-care. To assess basic foot care knowledge, the independent variables were gender, insurance status, and education level, whereas the dependent variable was the items associated with basic foot care knowledge. The mean score for those that had insurance ($2.57 \pm .99$) was higher than those that did not ($1.82 \pm .71$). The analysis indicated that a main effect of insurance status, $F(2,87) = 4.082$, $p = .020$, was detected, and was the only significant interaction found (Table 7).

Table 7: Insurance Status

	Mean \pm SD	F statistic (p value)
Gender		.18 (.665)
Male	2.53 \pm .95	
Female	2.44 \pm 1.01	
Insurance		4.08 (.020)
No	1.82 \pm .71	
Yes	2.57 \pm .99	
Education		.72 (.578)
Less than high school	2.50 \pm 1.21	
High School Graduate	2.26 \pm 1.00	
Some College/Associate	2.56 \pm .93	
College Graduate	2.59 \pm .98	
Professional School	2.47 \pm .85	

Discussion

Peripheral neuropathy and peripheral vascular disease are two of the major causes of lower extremity complications associated with T2DM. Many participants self-reported positive accounts of being either told or having symptoms of both of those complications. Peripheral neuropathy has been shown to be a major contributor to almost 80% of foot lesion (Akbari, Mascata, Smith, & Sidawy, 2004). With the lack of circulation also being a major contributor to non-healing lower extremity ulcers and wounds, arterial perfusion is needed to have adequate healing (Reiber, Boyko, & Smith, 1995). Although rates of lower extremity disease, especially lower extremity amputations, are higher in African Americans as opposed to whites, but the rates of hospitalizations related to those same complications and limb preserving procedures are lower (Rucker-Whitaker, Feinglass, & Pierce, 2003). Studies have shown that rates of diabetes related lower extremity complications can be considerably reduced by

preventive measures including preventive foot care behaviors and foot care education (Apelqvist & Larrson, 2000).

This study examined self-reported foot care knowledge and foot self-care practices of African Americans living with T2DM. Recommendations for T2DM care have often included foot care education and foot care skills components, with those related items being included in questionnaires regarding T2DM self-care management (Johnston et al., 2006). Foot care education and self-care skills should be tailored for each individual living with T2DM, taking into account health literacy levels, as well as socioeconomic status of the participants. Plummer and Albert (1995) noted that the educational needs for patients with diabetes should match the risk for developing lower extremity ulcerations. A study conducted by Pollock and colleagues (2004) found that self-reported foot care skills reveals what the participants knows about diabetic foot care. In order to reduce the risk of developing lower extremity complications that are so often associated with a T2DM diagnosis, interventions designed to improve foot care knowledge and foot self-care practices should begin early in the initial disease diagnosis (Fan, Sidani, Cooper-Prathwaite, & Metcalfe, 2014). Although this questionnaire also included questions on foot care from a professional, the study was only concerned with what foot care skill the participants actually performed outside the clinical encounter, and how much they knew about T2DM foot care.

During this study, participants were asked to answer how often they performed either basic or extended foot self-care in the last month. Majority of the participants understood how to properly trim their nails, which was determined to be an extended

foot self-care behavior, but very few of the participants performed basic hygiene or checked the water temperature, a basic foot care item. A comparison of the mean scores between the basic and extended questions reveals that basic foot care was performed more regularly. The participants were also asked to self-report how much they had ever been taught about either basic or extended foot care. More than half of the participants self-reported being taught how to keep their feet clean, but very few of the actually looked at the soles of their feet to check for any cuts, calluses, or open wounds. When comparing the basic and extended foot care education means scores, participants had less extended foot care knowledge than basic foot care knowledge.

This study also showed that insurance status of the participants had considerable influence on extended foot care knowledge of the participants. Lack of insurance is often been seen as a barrier to adequate foot self-care behaviors, and this study showed very similar results. Studies have shown that health insurance provides patients with appropriate care which can greatly improve health outcomes (Bernstein, Chollet, & Peterson, 2010).

Conclusions

The results of this study showed how in an African American population with T2DM, regardless of varied of education and gender, there are considerable differences between how foot care knowledge is used to translate into actual foot self-care behaviors. Although one can assume that knowledge translates into skill, there are very few studies that show just how or if foot care knowledge has any effect on actual foot

care skills. But as the incidence of T2DM continues to rise, diabetic foot care knowledge will become more important for clinical and research purposes (Olson et al., 2009).

Limitations

One of the limitations of this pilot study was the sample size. Although this is a feasibility pilot study, the results of this study cannot be generalizable to the entire African American population. Another limitation of this study was that majority of the questionnaires were completed online, which led to a number of the questionnaires to not be completed in their entirety.

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CHAPTER V

CONCLUSION

The overall purpose of this study was to provide evidence based insight into what African Americans understood about how lower extremity issues are developed from an existing type 2 diabetes diagnosis. The study also sought to give insight on how African Americans cared for their feet, and revealed any barriers to performing proper foot care that were present. This study has intended to: (1) examine the current body of literature that focuses on foot self-care knowledge and practice interventions within the United States; (2) used qualitative methodology to identify how African Americans living with type 2 diabetes use common sense assumptions to shape foot self-care practices; and (3) present the results of a validated foot care knowledge questionnaire tested in an African American population.

In order to understand fully what foot care interventions had previously been done in a population with type 2 diabetes, the author first used a systematic approach to the literature to uncover foot care knowledge and foot care practices interventions within the United States. There were 30 articles that fit the reviews' inclusion criteria, and each article was ranked using the Strength of Recommendations Classification Scheme. This studies included in this review were not only random controlled trials, but also survey design, cross-sectional studies, case-series, qualitative inquiries, and cohort studies. The review highlighted the lack of studies directed solely at the knowledge and skills needed for effective foot self-care.

The Self-regulatory Model of Illness Representations, developed by Leventhal and colleagues (1980), was theory utilized for the qualitative inquiry. The author sought to examine which common sense assumptions about lower extremity complications surrounding type 2 diabetes actually shaped how they managed any foot complications that they currently have or could have in the future. Common sense assumptions of disease allows the person to organize what they know about the disease, and determine if a plan of action is needed for any potential symptoms while managing the disease. This inquiry was important because someone with a type 2 diabetes diagnosis spends majority of their time outside of the clinical encounter, so the ability to know when to take action, or know what actions to take in the case of emergency is an important self-care management tool. The study also found that the concept of common sense assumptions needed to be examined in more detail, in other complications of type 2 diabetes.

A previously validated foot care knowledge questionnaire was used to examine what relationship self-reported foot care knowledge, foot self-care behaviors, and any barriers that may prevent adopting effective foot care habits had on long term foot care practices. The questionnaire used in this study contained six subscales: basic foot care education, extensive foot care education, basic professional foot care, extensive professional foot care, basic foot self-care, and extended foot self-care. There were probing questions inserted within the questionnaire on potential barriers to foot care, professional foot care, customized foot gear, and satisfaction with current foot care. A convenience sample of African Americans living with type 2 diabetes completed either an online version or a hard copy of the questionnaire. Descriptive analysis and analysis

of variance were employed during data analysis. The analysis indicated that a main effect of insurance status, $F(2,87) = 4.082$, $p = .020$, was detected, and was the only significant interaction found.

The results from the three studies conducted during this dissertation provides valuable information about foot self-care management practices of African Americans utilizing what they already know about the disease process. Further research should focus on foot care knowledge and skill of care givers of those with type 2 diabetes, standardizing type 2 diabetes foot self-care interventions across different populations, as well as expanding the foot self-care knowledge that is given to African Americans living with type 2 diabetes. It should be noted that this study was limited due to the number of participants that were able to be interviewed, as well as those that completed the questionnaire, lending to the findings not being generalizable.

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APPENDIX A
LOWER EXTREMITY KNOWLEDGE QUESTIONNAIRE

DIABETES FOOT CARE SURVEY

SECTION 1: INTRODUCTION

Survey Instructions

- Please complete the entire survey as carefully and honestly as you can.
- There are 8 sections. Please answer every question (unless you are asked to skip questions because they don't apply to you).
- Some questions may seem unnecessary or like questions you have already answered. There are small but important differences among the questions, so it is very important that you answer each one.
- This survey is intended to take about 20-25 minutes to finish. Because your careful attention to each question will help us gather the most accurate information, please take breaks between sections if you feel the need.
- Your comments are welcome. Please write them on the back of the survey.

1. Has a doctor or nurse ever told you that you have diabetes? *(check one)*

a) No



b) Yes

Please return the survey in the enclosed self-addressed envelope.

2. How long have you had diabetes? years

3. Was the first time you were told that you had diabetes within the Past 12 months?

a) No

b) Yes

Survey

Participant ID ____ _

SECTION 2: GENERAL HEALTH AND DIABETES CARE

1. Today's date: ___ ___ / ___ ___ / ___ ___
 mo day year

2. In general, would you say your health is: *(check one)*

- a) Excellent
- b) Very good
- c) Good
- d) Fair
- e) Poor

3. Compared to 12 months ago, how would you rate your health in general now? *(check one)*

- a) Much better now
- b) Somewhat better now
- c) About the same
- d) Somewhat worse now
- e) Much worse now

4. Are you confined to a wheelchair?

a) Yes  Go to Page 3, Question 6.

b) No  Go to the next page.

5. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much? *(circle one number on each line)*

	<u>Always</u>	<u>Often</u>	<u>Sometimes</u>	<u>Never</u>
Vigorous activities , such as running, lifting heavy objects, participating in strenuous sports	1	2	3	4
Moderate activities , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1	2	3	4
Lifting or carrying groceries	1	2	3	4
Climbing several flights of stairs	1	2	3	4
Climbing one flight of stairs	1	2	3	4
Bending, kneeling or stooping	1	2	3	4
Walking more than a mile	1	2	3	4
Walking several blocks	1	2	3	4
Walking one block	1	2	3	4
Bathing or dressing yourself	1	2	3	4

6. Are you able to see the bottoms (soles) of both your feet? (check one)

a) Yes

b) No ———→ If no, check all the reasons that apply:

Poor vision ^{6b1}

Joint, arthritis, hip or knee problems ^{6b3}

Overweight ^{6b2}

Other (specify _____) ^{6b4}

7. Has a doctor or nurse ever told you that you had the following? (check all that apply)

a) Nerve damage in your feet or legs

h) Stroke

b) Problems with circulation in your feet or legs

i) Cancer

c) Sores (*ulcers*) on your feet that did not heal
in one month

j) Kidney Failure

d) Heart attack

k) Chronic lung disease

e) Congestive heart failure

l) Problem with depression

f) Surgery to fix narrowed blood vessels in your
heart

m) Drug/alcohol problem

g) Surgery to fix narrowed blood vessels in your
feet or legs

8. In the past 12 months, how often have you had any of the following symptoms or problems?

(check one box on each line)

	<u>Never</u>	<u>Sometimes</u>	<u>Often</u>
a Numbness of your feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b Tingling sensation (<i>pins & needles</i>) in your feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c Burning pain in your feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d Problems with your balance or falling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e Pain in your thigh or calf muscles when walking that is relieved with a few minutes rest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. In the past 12 months, have you had any of the following on either foot?

	<u>No</u>	<u>Yes</u>
a) Callus(es) (<i>very thick skin</i>)	<input type="checkbox"/>	<input type="checkbox"/>
b) Corn(s) (<i>thick skin, that may be painful or irritating, usually on the little toe, tops of toes or between toes</i>)	<input type="checkbox"/>	<input type="checkbox"/>
c) Thick toenail(s) (<i>toenails that are difficult to trim</i>)	<input type="checkbox"/>	<input type="checkbox"/>
d) Ingrown toenail(s) (<i>toenail that grows into flesh</i>)	<input type="checkbox"/>	<input type="checkbox"/>
e) Athletes' foot (<i>fungal disease on feet</i>)	<input type="checkbox"/>	<input type="checkbox"/>
f) Cracks (<i>fissures</i>) on heel(s)	<input type="checkbox"/>	<input type="checkbox"/>
g) Foot ulcers (<i>sores that did not heal in one month</i>)	<input type="checkbox"/>	<input type="checkbox"/>

10. Check if you now have any of the following foot problems. (check all that apply)

Hammer or Claw Toes

Bunion(s)

Wounds/Ulcers

Charcot Foot Deformity

Amputation of one toe

Amputation of more than one toe

Amputation of part or the whole foot

Below the knee amputation(s)

Above the knee amputation(s)

11. If you have had an amputation, check which side of the body the amputation was on?

	<u>Right</u>	<u>Left</u>
a) Toe(s) only	<input type="checkbox"/>	<input type="checkbox"/>
b) Part or all of a foot	<input type="checkbox"/>	<input type="checkbox"/>
c) Leg, below the knee	<input type="checkbox"/>	<input type="checkbox"/>
d) Leg, above the knee	<input type="checkbox"/>	<input type="checkbox"/>

12. Was this amputation a result of trauma or military injury?

No

Yes

SECTION 3: YOUR SELF FOOT CARE

1. In the **past 4 weeks**, how often have you done the following activities for your feet?
(check one response for each line)

		Several Times a <u>Day</u>	Several Times a <u>Week</u>	Once a <u>Week</u>	Once or Twice a <u>Month</u>	Not at <u>All</u>
a	Looked at the bottom of feet for cuts, calluses and sores	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b	Checked between toes for cracks in the skin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c	Washed feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d	Soaked feet for more than 10 minutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e	Tested the water temperature with your hand or elbow before putting feet in water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Several Times a <u>Day</u>	Several Times a <u>Week</u>	Once a <u>Week</u>	Once or Twice a <u>Month</u>	Not at <u>All</u>
f)	Dried between toes after washing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g	Used lubricants (<i>lotion</i>) on your feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h	Filed calluses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i)	Trimmed nails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j)	Checked inside of shoes for rough edges or objects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

k	Wore stockings with your shoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l)	Changed your shoes during the day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m	Walked barefoot or in stockings inside your house	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n)	Walked barefoot outside	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Who did the following foot care for you in the past 12 months? (check all that apply)

		Health care				
		Family Member	Provider	Friend	No One	
		<u>I Did</u>	<u>Member</u>	<u>Provider</u>	<u>Friend</u>	<u>No One</u>
a	Look at the bottom of my feet for cuts, calluses and sores	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b	Check between my toes for cracks in the skin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c	File my calluses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d	Trim my nails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e	Check the inside of my shoes for rough edges or objects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 4: EDUCATION ABOUT YOUR FEET

1. How much have you ever been taught about taking care of your feet?

	<u>Nothing at All</u>	<u>A Little Bit</u>	<u>Some, But Would Like to Know More</u>	<u>Enough</u>
a) Checking your feet regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Keeping your feet clean	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) How to choose proper shoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Wearing shoes or slippers at all times	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) How to keep your skin moist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Using a special mirror to see the bottom of your feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Avoiding very hot and very cold temperatures to your feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Gently filing calluses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) Cutting nails according to the shape of your toe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) Not cutting corns and calluses with scissors or knives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k) Not using drugstore chemicals or other remedies not ordered by your provider	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l) <u>When</u> to call a health care provider if you have a foot ulcer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m) <u>Whom</u> to call if you have a foot ulcer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Check any of the following that kept you from taking the care of your feet in the last 12 months. (check all that apply)

a) I didn't know what to do

h) I didn't have a foot stool

- b) I know what to do, but I didn't know how to do it
- c) I didn't have time
- d) I couldn't afford it
- e) I didn't have the right shoes
- f) I didn't have the right shoe inserts
- g) I didn't have a mirror
- i) I couldn't remember to do it
- j) I needed professional help
- k) I needed help from family and friends
- l) I didn't think it was important
- m) I couldn't see well enough to do it
- n) I couldn't comfortably reach my feet to do it

3. **Which of the following professionals provided education or information about your feet in the past 12 months? (check all that apply)**

- a) Primary care provider
- b) Foot doctor (*podiatrist, surgeon*)
- c) Member of the diabetes care team
(*nurse, doctor, educator*)
- d) Rehabilitation specialist
(*physical therapist, kinesiologist, prosthetist, orthotist*)

SECTION 5: YOUR PROFESSIONAL FOOT CARE

1. In the last 12 months, in what health care settings did you get your foot care?
(check only one)

a) VA _____ → Go to Page 10, Question 2.

b) Hospital(s) ----- → Go to Page 10, Question 2.

c) Specialty Clinic(s) ----- → Go to Page 10, Question 2.

d) I did not get foot care _____ → Go to Page 12, Question 1.

2. During the last 12 months, did the professional you saw for your foot care ...
(circle one in each row)

	<u>No</u>	<u>YES, at least once</u>	<u>Yes, more than once</u>
a) <i>Ask you about numbness or tingling in your feet</i>	1	2	3
b) <i>Look at your feet with your shoes and socks off</i>	1	2	3
c) <i>Examine the tops and the bottoms of your feet</i>	1	2	3
d) <i>Look between your toes</i>	1	2	3
<i>Test the feeling in your feet with a tuning fork or</i>			
e) <i>monofilament (a bendable nylon "fiber" on a handle)</i>	1	2	3
f) <i>Shave your calluses</i>	1	2	3
g) <i>Trim your toenails</i>	1	2	3
i) <i>Look at your shoes</i>	1	2	3
j) <i><u>Tell you</u> how to select proper shoes</i>	1	2	3

3. In the last 12 months, which health care professional took care of your feet?
(Foot care includes examining your feet, toenail and callus care.) (check all that apply)

- a) Primary care provider
- b) Foot doctor (*podiatrist, surgeon*)
 - If you saw a foot doctor more than once, was it the same foot doctor at each visit?
 - No Yes
- c) Member of the diabetes care team (*nurse, doctor, educator*)
- d) Rehabilitation specialist (*physical therapist, kinesiologist, prosthetist, orthotist*)

4. In the last 12 months, have your foot care provider(s) involved you in making decisions about your foot care? (check one)

- a) No

b) Yes, some but not enough involvement.

c) Yes, enough involvement

5. Are there any services you now need for your foot care that you are not receiving?

a) No

b) Yes →

If yes, please list or describe them for us:

SECTION 6: YOUR FOOTWEAR

1. Which type of shoe do you wear most of the time... (Check ONLY one)

House slippers _____

Shoes your doctor ordered _____

Dress shoes _____

Sandals _____

Casual Shoes _____

Sneakers/Tennis Shoes _____

Barefoot/Panty Hose _____

2. Do you have difficulty fitting into shoes from regular stores?

- a) No
- b) Yes

3. Do you know who to contact for problems with your shoes?

- a) No
- b) Yes

4. Has a health care provider recommended that you wear a certain type of footwear within the last 12 months? (check one)

a) No



Go to Page 14, Question 1.

b) Yes



Go to the next question.

5. What footwear was recommended? (check all that applies)

- a) Off the shelf shoe inserts
- b) Custom shoe inserts
- c) Better casual and everyday shoes

d) Extra depth shoes

e) Custom shoes

f) No foot wear was recommended

6. In the last 12 months, have you worn the shoes your doctor recommended?

a) Yes, all the time.

b) Yes, most of the time.

c) Yes, some of the time.

d) No → If no, what prevents you from wearing the shoes your doctor ordered?

(check all that apply)

The shoes hurt my feet

The shoes make my feet hot

The shoes don't fit well

I don't like the way the shoes look

I didn't buy the shoes

The shoes wore out and were not replaced

Other (specify _____)

7. Who paid for the shoes your doctor recommended? *(check all that apply)*

a) VA

b) Medicare

c) Private health insurance

d) You or your family

SECTION 7: SATISFACTION WITH FOOT CARE

1. How strongly do you agree with the following statements about the foot care you received in the last 12 months from your health care provider? (circle one answer in each row)

	Strongly <u>Disagree</u>	<u>Disagree</u>	Neither Disagree <u>Nor Agree</u>	<u>Agree</u>	Strongly <u>Agree</u>	Not <u>Applicable</u>
I can get a foot care appointment in a reasonable amount of time						
I can get my foot care and diabetes care on the same day						
I can get my nails cut when I request it						
I can get my calluses trimmed when I request it						
I know <u>whom</u> to call if I have a problem with my feet						
I know <u>where</u> to go to get my toe nails trimmed						
I know <u>where</u> to go if I have a foot ulcer						
I know <u>where</u> to go for care if I have a circulation problem in my feet or legs						
I know <u>when</u> to call for help with a problem about my feet						

I see the same foot doctor all the time

<u>Strongly Disagree</u>	<u>Disagree</u>	<u>Neither Nor Agree</u>	<u>Agree</u>	<u>Strongly Agree</u>	<u>Not Applicable</u>
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I don't like being assigned foot doctors in training

I receive conflicting information and advice about my feet

The foot care providers at my facility work well as a team

I am given choices in days for my next foot care visit

If I miss an appointment someone calls me

I am satisfied with the explanations my health care provider has given me about my foot problems

I am satisfied with the current treatment of my feet

Special footwear is readily available when I need it

I am not satisfied with the footwear provided for me

I would like more frequent foot care

SECTION 8: INFORMATION ABOUT YOU

The following questions ask general information about you.

1. **What is your age?**
- a) Under 17 years old
 - b) 18 - 45 years old
 - c) 45 - 64 years old
 - d) 65 years and older

2. **Are you ... (check one)**
- a) Male
 - b) Female

3. **How tall are you without your shoes?**
- a) 4ft 10 in – 5ft 2 in
 - b) 5ft 3in – 5ft 5 in
 - c) 5ft 6in – 5ft 8in
 - d) 5ft 9in – 6ft
 - e) >6ft 1in

4. **How much do you weigh now?**
- a) <125
 - b) 125-149
 - c) 150-174
 - d) 175-199
 - e) 200-224
 - f) 225-249
 - g) >250

5. Do you smoke?

a) No

b) Yes

6. How many years of formal schooling have you completed? (check one)

a) Less than high school

b) High school graduate

c) Some College/Associate Degree

d) College Graduate

e) Professional School

7. Are you enrolled in Medicare? (check all that apply)

a) No

b) Yes, Part A

c) Yes, Part B

8. What other kinds of health insurance coverage do you currently have? (check all that apply)

a) VA Health Coverage

d) US Forces (Champus, Tri-Care)

b) Medicaid

e) Don't know

c) Private insurance

9. Did someone else help you complete this survey? (check one)

a) No

b) Yes

Thank you for your help with this survey! Please make your comments on the back.