USE OF AUDIO-VISUAL PATIENT EDUCATION TO ENHANCE DIABETIC FOOT CARE

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Abstract

of

USE OF AUDIO-VISUAL PATIENT EDUCATION TO ENHANCE DIABETIC FOOT CARE

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Statement of the Problem

Type 2 diabetes mellitus (DM II) is known to lead to serious long term complications in patients with poorly controlled blood glucose, poorly managed symptoms, and unchanged life styles. Patient education and subsequent modifications of their behavior are the keys to preventing or at least delaying, these complications and improving the quality of patient’s lives. In the past, nurses and other medical professionals have been approaching patient education with different methods, settings, and formats. These have been met with varied degrees of success.

Sources of Data

This project sought to investigate whether a Digital Video Disc (DVD) from Family Health Media, focused on diabetic foot care, would prove to be more accessible to patients, bringing forth better retention of information regarding foot care and examination skills than written materials or individual teaching in family practice settings.
Conclusion Reached

This thesis set out to examine if the use of Audio-visual patient education would improve patient’s skills regarding self examination of feet (diabetic foot care) to reduce the risks of diabetic foot ulcers. The DVD finding revealed, when combined with written materials, had a more positive impact on retention regarding recognition of the signs of infection and behavioral changes which positively affecting foot care as compared to written materials alone.

______________________, Committee Chair
Joyce Mikal-Flynn RN, FNP, MSN, Ed.D.

_____________________
Date
DEDICATION

We wish to dedicate this thesis to all of those kind individuals who helped us make this possible. Without the support of husbands, family, fellow nurses, professors and physicians, none of this would have been possible. Also, we wish to thank and dedicate this thesis to those patients that we have had the privilege to care for throughout our nursing careers and specially those patients that participated in our research study on diabetic foot care.
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Chapter 1

PROBLEM STATEMENT

Introduction

The incidence of diabetes mellitus (DM II) has risen dramatically in the United States since 1940 (McCance & Huether, 2002). Nationwide, 7% of the population has diabetes (California Diabetes Program, 2005). The Center for Disease Control (CDC, 2007) indicated that 23.6 million people currently have Diabetes; 17.9 million have been diagnosed and according to the CDC 5.7 million people are undiagnosed. It is the most common endocrine disorder in the U.S. (CDC, 2005; Jerreat, 2003; McCance & Huether, 2002).

Diabetes mellitus (DM) is a group of metabolic conditions characterized by hyperglycemia, resulting from defects in insulin secretion, insulin action, or both. Diabetes is categorized into diabetes mellitus type 1 (DM I) and diabetes mellitus type 2 (DM II). Diabetes mellitus is a metabolic disorder in which the body has a deficiency of and/or a resistance to insulin (Jerreat, 2003). Insulin resistance is heightened by obesity, inactivity, illnesses, medications and age. It is present in 60% to 80% of individuals with DMII (CDC, 2005).

Diabetes mellitus is an insidious disease, with the risk of developing it increasing with age. It was formerly associated with advanced age and usually diagnosed after age 40. Today, DM II is diagnosed in earlier ages due to increased obesity and increasing body mass index beyond the ideal body weight. This decreases sensitivity to insulin, thus causing receptor defects (Anderson, 1985; Barnwell & Raskopf, 2000).
The CDC (2005) revealed that 65% of deaths in the diabetic population result from cardiovascular disease. Over 70% of diabetic patients have hypertension and use anti-hypertension therapy. Significant and life-changing amputation of lower extremities occurs in 60% of diabetic patients.

The clinical features and classic symptoms of DM, specifically type 2, are mild fatigue, weakness, dizziness, blurred vision, polyuria, polydipsia, polyphagia, and weight gain. Other nonspecific complaints may dominate the clinical pictures or may be tolerated for many years before a patient seeks medical attention (Tierney, McPhee, & Papadakis, 2005). Education regarding life-style changes and early intervention is crucial to prevent or delay complications of DM II and lead to greater well-being of diabetic patients. The majority of these symptoms are preventable with good glucose control through diet, exercise, and proper foot care, including daily self-examination of feet, appropriate shoes and orthotics when needed, and early referral to a podiatrist (Booth, 2000).

The complications of diabetes are serious problems that impact the cost of treatments (CDC, 2006). It has been estimated that the cost to society is approximately $92 billion dollars in direct medical costs (CDC, 2005). The indirect costs resulting from disability, work loss, and premature mortality is estimated to be $40 billion (CDC, 2005). About 5% of National Health Services resources and up to 10% of hospital inpatient resources are liable to be used for the care of patients with diabetes (National Institute of Health [NIH], 2008). Mason et al. (1999) reported there are more hospital bed days to treat foot problems than for all other diabetic complications.
The costs of treating diabetic foot disease relate to the individual treatment required. There are ranges in costs, but the most significant costs are related to high bed occupancy. A vascular unit serving a population of 500,000 people will expect to see 100 vascular diabetic patients per year who will undergo amputation of a limb (Ollendorf et al., 1998). Additionally, the rate of lower-limb amputation in diabetic patients with end-stage renal disease is ten times greater than in the general population of patients with diabetes (Mark, McNally, & Jones, 2003). Diabetes significantly influences one’s quality of life as a result of multiple complications, along with the complicated regimens of disease management and the stress of self-management which require behavior changes. The focus of this research is an examination of the media formats for the delivery of patient education related to foot problems associated with DM II.

The Problem

Health care professionals should respond as proactively as possible to the rising numbers of people diagnosed with DM II, placing priority on preventative education in order to ameliorate the impact of complications for diabetics. The costs to society, including lost wages and productivity, are significant (NIH, 2008). Additionally, the cost to the individual patient with complications of diabetes, including suffering and disability, are immeasurably high (NIH, 2008). Diabetes requires a great deal of patient self-management and changes in lifestyle (Brown, 1990). Diabetes educational programs are not a new area of study and some have shown positive results of self-management. However, according to meta-analyses in diabetes education (Brown, 1992; Warsi, Wang,
LaValley, Avorn, & Solomon, 2004), many of the studies reviewed revealed correlations between behavioral changes and physiological markers.

In general patient education for diabetics, diabetic foot care in particular, has often been met with mixed results. A review of current research regarding educational programs for diabetic foot care revealed a variety of problems ranging from lack of standardized study inclusion criteria, small sample sizes, and lack of evaluation measurements (Mason et al., 1999; Nutbeam, 2006). Additionally, patient education in health care issues must take into account principals of learning and educational theory, literacy levels, patient motivation, and accessibility. If the complexities of these types of behavioral factors are not considered, educational interventions are not likely to be successful (Glasgow et al., 1998; Rankin & Duffy Stallings, 2001).

Considering both the quantity and level of new information required for patients to learn self-management techniques, it is imperative that effective teaching materials be available and accessible to all patients (Redman, 2004). It is the goal of this patient education project to focus on preventative measures, specifically as it relates to diabetic foot care, and provide a tool that will easily enable patients and family members to implement appropriate foot evaluation and care on a daily basis.

Summary

Health care professionals have been faced with many challenges to provide effective patient education for diabetics. The purpose of this study is to evaluate the use of a professionally prepared audio-visual DVD from Family Health Media, Preventing Diabetic Foot Ulcers: The 3-Step Program (2005), on diabetic foot care and its’
influence on patients’ psychomotor skills, as well as evaluate if this educational tool raises skill levels and reduces potential foot problems as compared to written materials (i.e. educational pamphlets). All educational interventions will ideally affect the patient’s knowledge, thus the practice of appropriate foot care will decrease or reduce foot problems and ultimately lead to a reduction in amputations. Even though the skills being taught are relatively simple, the format for presenting this information is being examined.

The main focus of *Preventing Diabetic Foot Ulcers: The 3-Step Program* is to educate patients on how to do daily foot care and examination prompting early detection of abnormalities. The DVD provides illustrations and uses very simple language in English and Spanish. With this educational tool, patients may achieve self-management of foot care: prompting early detection of foot problems. Additionally, given the nature of the foot care skills required, the psychomotor tasks may be better learned via modeling as shown on the DVD. There are also issues of a patient’s comfort level in performing these skills in any kind of public setting. The DVD format allows foot care education to be done in private and may increase motivation and self-efficacy.
Chapter 2

LITERATURE REVIEW

Introduction

Diabetes mellitus type 2 (DM II) has well defined diagnostic criteria and its complications are equally understood (McCance & Huether, 2002). From the early research, it has been shown that patient involvement and patient education is crucial for proper management of the disease (Redman, 2004). This is not only true for control of glucose levels, but also for managing and monitoring other serious complications, such as peripheral neuropathy (Redman, 2004).

Diabetic patient education has been researched extensively because of the vital importance of patient’s knowledge and skill in managing their disease (Wingard, 2005). However, when focused on specific skills, such as foot care, research has offered mixed results (Perrin, Swerissen, & Payne, 2009). In the case of diabetic foot care, educational interventions of any type have been shown to have at least some temporary positive learning effects for patients (American Diabetes Association [ADA], 2004).

Given the serious nature of foot problems and its profound impact on patients, their livelihood and society in general, it would seem that educational efforts directed and focused on this specific area would be warranted (ADA, 2004). In terms of numbers of patients who may experience this and other complications and with the growing number of cases of diabetes mellitus nationwide, the focus on preventative management in the form of patient education is essential (Wingard, 2005). In today’s healthcare environment
and the current economy, patient education that makes prevention a focus is the preferred course (Redman, 2004).

The literature review is focused on the pathophysiology of DM II and complications involving the foot, specifically focused on findings regarding general education for both DM II and foot care education. It examines theories regarding education and learning principles which underlie diabetic foot care education as a framework for choosing specific educational formats suited for teaching and matched to the unique patient situation.

_Type 2 Diabetes_

_**Diagnosis**_

The diagnosis of DM II is based on a fasting plasma glucose level equal to or greater than 126 mg/dl or a random plasma glucose equal to or greater than 200 mg/dl together with:

1. Polyuria, polydipsia, and polyphagia,
2. Unexplained weight gain,
3. A two-hour plasma glucose of 200 mg/dl or greater following a 75 gram glucose load.
4. HgbA1C >6.0

An individual elevation must be repeated with a separate test on a different day to confirm the diagnosis (Goldman & Ausiello, 2004).

Individuals whose blood glucose levels are above 126 mg/dl have impaired fasting glucose (IFG)-a vital component of diabetes management. Abnormal glucose
metabolism may be caused by the inability of pancreatic islet B cells to produce insulin, reduced numbers of insulin receptors, faulty intestinal glucose absorption, inability of the liver to metabolize glycogen, or altered levels of hormones that play a role in glucose metabolism (Fishbach & Dunning, 2004). Impaired glucose tolerance refers to a two-hour plasma glucose greater than 140 mg/dl but less than 200 mg/dl. Impaired fasting glucose and IGT are not specific clinical entities, but represent risk factors for the future development of diabetes and cardiovascular disease (Goldman & Ausiello, 2004).

The National Diabetes Data Group (NDDG) and World Health Organization (WHO) have issued similar criteria for diagnosing diabetes in asymptomatic persons based on elevated fasting plasma glucose (> 140 mg/dl) or an abnormal plasma or serum glucose using a two-hour 75g oral glucose tolerance test (OGTT). The National Diabetes Data Group criteria for diagnosing diabetes is a positive oral glucose tolerance test greater than 200mg/dl at two hours alone and an abnormal glucose measurement on more than one occasion (Lawrence & McGinnis, 2002). The most commonly used screening tests for DM II include measurements of serum or plasma glucose in fasting or postprandial specimens, measurements of glycosylated proteins in the blood, and detection of glucose in urine. The sensitivity and specificity of the fasting plasma glucose, compared to diagnostic oral glucose tolerance testing, depends on the threshold set to define an abnormal screening result (Guide to Clinical Preventive Services [GCPS], 2002). A single fasting glucose above 140 mg/dl is specific for diabetes over 99% of the time (McCance & Huether, 2002).
**Prevalence**

Diabetes Mellitus II is the seventh leading cause of death in the U.S., contributing to roughly 160,000 deaths each year (GCPS, 2002). Diabetes mellitus II in adolescence is increasing at an alarming rate. Younger patients are typically overweight, maintain a calorie-laden diet, and lack participation in physical activity (Fajans, Bell, & Polonsky, 2001). Some individuals may develop maturity-onset diabetes of the young, a specific autosomal dominant subtype of DM II, with a genetic predisposition for development of DM II in adolescence or early adulthood. Patients who do not have autosomal antibodies are treated similarly to those patients with classic DM II (D’Alessandro & Dosa, 2001).

**Populations Affected by Diabetes Mellitus**

The prevalence of DM II in the United States varies by ethnic group. The condition is most common in Native Americans, with 27% of total population meeting the qualification for diagnosis. Other groups show lesser but significant percentages of the total populations. Respectively they are: Hispanics/Latino Americans 14%, African Americans 13.3%, and Non-Hispanic whites 8.7% (Bonds et al., 2003; NIH, 2008). Total prevalence of DM II in 2005 in the U.S. among people 20 years or older was 20.6 million (9.6%) and age 60 years or older was 10.3 million (20.9%). Men have DM II more often than women: 10.9 million men (10.5%) compared to 9.7 million women (8.8%) (National Health Interview Survey (NHIS), 2005).

The cause of the common form of DM II is not clearly known, but it is strongly associated with insulin insensitivity and increasing body mass index (BMI) ratios (McCance & Huether, 2002). It affects people primarily over 40 years of age, most of
who are diagnosed as clinically obese (McCance & Huether, 2002). Diabetes, especially when poorly managed, has many varied and serious consequences which greatly impact patients’ lives, their families, and society as a whole (Healthy People 2010, 2000). Many of these complications can develop into long-term health conditions.

As mentioned earlier, studies indicated that DM II is more common in Native Americans, Hispanics, and African Americans in the United States (McCance & Huether, 2002). Minorities in the United States exhibit a higher prevalence of diabetes six times greater than that of Caucasians. According to the Centers for Disease Control (2005), Native Americans have a disproportionately higher prevalence of diabetes 2.8 times that of whites of similar age. These minority populations are at higher risk not just due to their family history and genetics, but because of the adoption of American habits of high caloric diets and sedentary lifestyles (Fletcher, Gulanick, & Lamendola, 2002).

Clinical Symptoms

Classically, symptoms such as fatigue, weakness, dizziness, blurred vision, polyuria, polydipsia, polyphagia, and weight gain appear abruptly over days or weeks in previously healthy non-obese children or young adults. In older patients the disease may manifest more gradually (Tierney et al., 2005).

Late clinical manifestations of DM II are due to axonal neuropathic process. Sensory involvement usually occurs first and is generally bilateral and symmetrical. It is associated with dulled perception of vibration, pain, and temperature, particularly in the lower extremities (Tierney et al., 2005). A common metabolic disorder, syndrome X, results largely from obesity related insulin resistance. This syndrome involves a cluster of
metabolic abnormalities such as abdominal obesity, dyslipidemia, hypertension, and insulin resistance, with or without impaired glucose tolerance. These metabolic abnormalities lead to an increased risk of DM II and cardiovascular disease (Goldman & Ausiello, 2004).

**Major Risk Factors for Type II Diabetes**

Major risk factors for families with a history of diabetes, especially in first degree relatives include:

1. Obesity diagnosed with a BMI greater than greater than 27kg/m or 20% over the desired total body weight,
2. Habitual physical inactivity,
3. Impaired fasting blood glucose greater than 110 and HbA1c greater than 6 (Fletcher et al., 2002).
4. Hypertension greater than 140/90 mm Hg in adults,
5. High density lipids (HDL) less than 35 mg/dl, triglyceride level greater than 150, and low density lipids (LDL) greater than 100
6. Race and ethnicity (Weiland & White, 2002).

**Complications of Diabetes Type II**

The ADA (2006) categorizes heart disease, stroke, foot disease, kidney disease, eye problems, skin problems, gastroparesis, neuropathy, and depression as major complications of DM II. Cardiovascular disease occurs at a rate two to four times higher in diabetic people (Healthy People 2010, 2000).
Seventy-three percent of diabetics suffer from hypertension (Healthy People 2010, 2000). Insulin resistance and DM II usually are accompanied by one or more metabolic abnormalities. Obesity contributes to increased coronary vascular disease (CVD) risk by aggravating its’ risk factors, including hypertension, insulin resistance, low HDL cholesterol, high LDL and hypertriglyceridemia (Goldman & Ausiello, 2004).

Distal symmetric polyneuropathy is the most common form of diabetic peripheral neuropathy. The loss of function appears in a stocking-glove pattern and is due to an axonal neuropathic process. Bilateral and symmetrical sensation occurs first and it is associated with dulled perception of vibration, pain, and temperature, particularly in the lower extremities. Both motor and sensory nerve conduction is delayed in peripheral nerves causing ankle jerks to be absent. Motor weakness is usually mild and confined to the most distal intrinsic muscles of the hands and feet (Goldman & Ausiello, 2004).

However, the most concerning issue associated with peripheral neuropathy is the high risk of limb loss, which is directly related to neuropathy and vascular disease (Bennerr, 2006; Boulton et al., 2005). Neuropathy leads to hypersensitivity to light touch, occasionally severe burning pain on lower extremities, abnormal weight bearing, neuropathic ulcers, stress fractures, and charcot joints (Votey & Peters, 2004). Vascular disease causes skin atrophy and dryness and prevents healing of neuropathic ulcers (Booth, 2000).

Most of the long-term complications of diabetes can be prevented or delayed by lifestyle changes. The Centers for Disease Control CDC (2007) suggested these changes be initiated through teaching disease management. There are national efforts to delay and
prevent complications of diabetes such as retinopathy, nephropathy, neuropathy, and cardiovascular disease (Brownlee, 2005). The control of blood sugar, blood pressure and lipid levels are very important in the prevention diabetic complications.

**Foot Problems**

Diabetic foot ulcers are a complication affecting approximately 15% of the total population with DM II and DM I. Diabetes is the most common cause of polyneuropathy, with approximately 50% of diabetics affected within 25 years of diagnosis, and is responsible for over 50% of the 120,000 annual non-traumatic amputations of lower extremities in the U.S. (GCPS, 2002, Votey & Peters, 2004). Sixty percent of diabetics will have amputations of lower extremities (Healthy People 2010, 2000). The incidence of gangrene of the feet in a diabetic is 20 times greater than the incidence in matched controls. The factors responsible for gangrene development are ischemia, peripheral neuropathy, and secondary infection (Tierney et al., 2005). Treating these ulcers is costly, with 25% of all hospital admissions related to diabetic ulcers and complications. The resulting disfigurement is devastating and problematic (Coles & Coppinni, 2004).

Ulcers on feet cause serious infection, prolonged suffering, and amputations. Foot ulceration can also develop due to the complication of diabetic peripheral neuropathy as well as compromised arterial blood supply (Bielby, 2006). Diabetic peripheral neuropathy can involve the loss of protective sensation leading to the decreased ability to feel pain from injuries affecting the foot (Bryant & Beinlich, 2003). Patients can also experience a variety of painful symptoms which are difficult to control, such as burning, sharp shooting pains, and paresthesia in their feet. Clayton and Elasy (2009) add that
patients with diabetic peripheral neuropathy develop dry skin with callus and fissures that can lead to ulceration. The compromised arterial supply and effect of diabetes on the immune system mean that patients also have a reduced inflammatory response to heal wounds and overcome infection (Foster & Bentley, 2008).

Diabetes is the main cause of amputations in people of working age (Springett, 2002). Ten percent of non-healing foot ulcers are due to peripheral vascular disease and diabetic peripheral neuropathy (Springett, 2002). The loss of a limb remains one of the most feared complications of this condition (William, 1997).

The ADA (2006) aims to reduce the complications associated with diabetes. Targeting foot care of people who are at high risk attempts to prevent hundreds of amputations each year. The National Institute for Clinical Excellence (NICE, 2004) also emphasizes the need for preventive measures, such as regular foot screening and health education, that should extend to patients and family members. The involvement of family members was found to positively influence the amount of foot care performed by patients (Bell et al., 2005). The NICE (2004) documents provide guidelines on the frequency of the assessments required depending on the degree of foot problems and suggest pathways for referrals for further assessment and treatment.

**Diabetic Education**

The effect of teaching simple health maintenance techniques provides opportunities for patients to learn about, and possibly reduce, the incidence and severity of complications due to a chronic disease. The importance of blood glucose monitoring and control, adequate exercise, balanced diet, correct administration of
anti-hyperglycemic agents, skin and foot care, and signs of hypoglycemia are taught by health care professionals in order to prevent complications of diabetes (Bradshaw, McColl, Eccless, Bryce, & Sampson, 1999). Despite current efforts, significant problems exist and the need for patient education remains great. The Behavioral Risk Factor Surveillance System survey of 2001-2002 found 50% to 80% of patients diagnosed with DM II had one or more knowledge deficits on risk factors of diabetes (Behavioral Risk Factors Surveillance System, 2001-2002).

Patient education must be tailored to match patient literacy levels and the unique aspects of their conditions (Krichbaum, Aarestad, & Buethe, 2003). While showing positive results, the majority of research on education regarding diabetes suffers from methodological problems, such as flawed study design, inappropriate statistics or conclusions not reflecting the results, lack of appropriate comparison groups, and difficulties in making correlations between behavioral changes and physiological markers (Brown, 1992; Glasgow et al., 1998).

Due to the nature of this disease, occurring in late adulthood and accompanied by other preexisting conditions, educational outcomes for patients are difficult to assess because of their literacy level. Rhee et al. (2005) reported that age, vision, and the educational level of patients are significant barriers to diabetes education. Smith and Smith (1994) and Wilson (2009) evaluated the readability of patient education publications using the Gram-mat-ik IV software program and the reading grade level using the Flesch Reading Ease scale. They found that most brochures used for patient education were at the 8th to 9th grade level of comprehension and patients’ reading level
was only at a 7th grade level. They suggested that other factors should also be considered when providing written educational materials, including cultural factors, language, visual attractiveness, legibility of letters, readable print size, and consistent format.

Patient education in diabetes is essential to prevent complications from the disease. Difficulties arise when assessing effectiveness of educational interventions in relationship to patients’ comprehension and behavior modification. Therefore, interventions need to be tailored and accessible to patients, taking into consideration the patient’s formal education (Wilson, 2009). The National Interview Survey from 2010 found only 45% of diabetic patients had a formal education. In that descriptive summary, Latinos from Mexico and Central America, people with less than high school education, and people over 75 years of age show dramatically low rates of formal education. One stated objective of Healthy People 2010 (2000) is to increase the level of formal education up to 60%. It also emphasized informing people about the associated risks in diabetes and motivating patients with increased knowledge of complications, such as foot ulcers, hypertension, and hypoglycemia. Additionally, due to increased elderly populations and immigration, it is necessary to use a multicultural approach and a variety of teaching materials in diabetes education (Healthy People 2010, 2000).

In the clinical settings in which most diabetic patients are currently seen, there are many challenges associated with providing patients with educational teaching materials specifically tailored to patients’ educational and cultural backgrounds (Wilson, 2009). Research, specifically regarding education in diabetic patients, demonstrated difficulties in creating change due to the complexity of initiating behavioral changes in this patient
population (Corbett, 2003; Glasgow et al., 1998). Numerous educational programs for diabetic patients have been instituted to assist in controlling blood glucose levels, thus preventing complications. A recent meta-analysis involving patient education research for diabetic patients consistently demonstrated positive effects on knowledge on symptoms of diabetes, interventions and outcome. However, in many cases, these effects were short-term or did not correlate to improved physiological parameters (Brown, 1992; Corbett, 2003).

As mentioned earlier, family and support systems of patients with DM II are essential in diabetes education. Self-management of diabetes involves the understanding and participation of others who live with diabetic patients in order for them to have lifestyle changes. Wen, Shepherd, and Parchman (2004) found a positive association of high levels of family support and self-efficacy in relationship to exercise and improved diet among Mexican Americans. Since regimen of diabetic care involves life-style changes, family members should be actively included in educational programs (Weston-Eborn & Sitzman, 2005).

Nurses have important roles in patient education due their involvement in direct care of patients and having more opportunities to be involved in patients’ support systems. Davidson (2003) revealed that in minority diabetic populations, a nurse’s direct diabetes care in the form of education had more positive effects on controlling blood glucose levels in patients as compared to the physician who directed care in the clinic.

Health care practitioners, specifically nurses, have not successfully provided diabetic patient education, often due to lack of time and resources (Nettles, 2005). Even
though information is provided, teaching is often a one-way communication via pamphlets; and patients do not utilize this information well or do not understand it due to the patient’s literacy level (Wilson, 2009). Davis, Crouch, Wills, Miller, and Abdehou (1990) and Wilson (2009) also found that the educational materials provided revealed an average of five years difference between the level of material presented and the average reading level of patients.

**Foot Care Education**

Diabetic foot care has been one important area of focus in diabetes education. Foot and skin care are uniform and very simple procedures which nurses and nurse practitioners can emphasize and patients can comprehend easily. However, it is an area of care that is often overlooked in clinics (ADA, 2004). A recent study in the United Kingdom suggested that one-third of patients surveyed had no recollection of receiving foot care education (Basu, Haldey, Tan, Williams, & Shearman, 2004). Others (Pollock, Unwin, & Connolly, 2003) have noted that knowledge deficits of foot care can be correlated to more high risk foot practices.

Diabetic foot complications are defined as neuropathy, foot ulcers, skin changes, calluses, changed circulation, and amputation (ADA, 2004). For general diabetic foot care, guidelines by the National Guideline Clearinghouse (2000) stated that patient education is a central part of management, especially where behavioral contracts are used. Foot care education is simple and teaches preventive measures in order to avoid the serious complications of severe infections and amputations on lower extremities (Edwards, 2008; Lavery, Armstrong, Wunderlich, Tredewell, & Boulton, 2003; Mayfield,
The formation of foot ulcers should be visualized and monitored by individual patients and foot care performed by them on a regular basis at home to prevent further complications (ADA, 2004). Viswanathan, Madhavan, Rajasekar, Chamukuttan, and Ambady (2005) summarized that educational programs help reduce the occurrences of ulcers and promoted faster healing. Wrobel et al. (2003) revealed that well-coordinated preventive foot care will reduce the amputation rate by 50% and care practices for skin and foot care are needed in a timely manner to prevent diabetes related foot complications.

Despite the limitations in general diabetic patient education, it has been noted that any intervention shows positive results in foot care. Timely follow-up assessment on foot care is a necessary factor for the patient to retain information (Borges & Ostwald, 2008). It has been demonstrated that educational interventions delivered by trusted professionals can positively impact patients’ self-care levels, even if these educational interventions produce short-lived results as some research suggests (Johnson et al., 2005; Valk, Kriegaman, & Assendelft, 2001). Some studies show that diabetic self-management of foot care is one aspect that patients are able to understand. When patients read educational material on diabetic foot care, they show improvement and interventions appear to be beneficial in reducing risks (Boren, Gunlock, Schaefer, & Albright, 2007). Other researchers (Gale et al., 2008) have found confusion in patients regarding ulcerations and amputations, as well as difficulties in communication with health professionals.
Research on foot care education has faced other difficulties. Martinez and Trip-Reimer (2005) pointed out a major weakness of foot care education is due to a lack of valid measurements of psychomotor skills. Many studies from the Diabetes Research and Training Center involving diabetic foot care were not helpful because they suffered from small sample size, short duration of intervention, or included some outcomes unrelated to ulcers (Mason et al., 1999; Walker & Wylie-Rosett, 2001). Other studies pointed out the lack of standard measures to assess the effectiveness of foot care education (Lincoln, Jeffcoate, Ince, Smith, & Radford, 2007).

Patient education, as defined by Piccininni and Drover (2000), is the process by which a patient learns or acquires knowledge about his or her health status or condition and may involve learning in the cognitive, affective, and psychomotor domains. Chin (1998) identified the cognitive domain as activities of knowledge comprehension, processing, and recalling information. An example of patient education in the cognitive domain is stating the purpose of foot and nail care or the causes of a foot ulcer. The affective domain involves focusing on feelings, values, and attitudes. Having patients verbalize and deal with feelings about a diagnosis and accept responsibility for self-care is one use of the affective domain. The psychomotor domain involves performance, skilled movements and motor functions, i.e. patient foot inspection and wound care (Chin, 1998).

The challenges of learning in the diabetic patient population are due to individual differences in learning styles and literacy levels (Wilson, 2009). Information that is not tailored to individual learning levels and needs may be difficult for this population to
incorporate into their lives. As discussed earlier, individual patients have different styles of learning, thus utilization of different learning modalities to obtain knowledge must be considered (Healthy People 2010, 2000). First, information should be described in simple language, containing sufficient illustrations and visualizations to which the viewer can relate. Research supports the notion that clearly stated points which use simple language are more effective (Murphy, Chesson, Walker, & Arnold, 2000; Reid et al., 1995). In some cases, a patient’s literacy level does not allow them to acquire important information if it contains medical terminology (Davis et al., 1990; Wilson, 2009). Murphy et al. (2000) emphasized using simple words and culturally diverse information for increased effectiveness of teaching and further stated that the use of suitable informational materials are needed. Moreover, in order to meet patients’ learning needs and increase retention of concrete information, materials should be available in multiple modalities. Reid et al. (1995) and Murphy et al. (2000) suggested that patient education should include multiple types of delivery materials such as videos, pamphlets, and discussion groups to improve patients’ knowledge. Educational strategies must be suitable for all patients.

By the mid 1990s, research revealed the effectiveness of computer-based education and audio-visual methods. This media was shown to be an effective tool for the educational process in patients at all levels of education (Longstaffe, 1996). Other studies focused on computer- based multimedia in clinical settings have shown the value of this tool in effectively teaching about diabetes-related complications, especially for patients with low literacy levels (Gerber et al., 2005). Research on the effectiveness of videos as
opposed to written materials, such as pamphlets, reported patients with Chronic Obstructive Pulmonary Disease revealed increased knowledge, as well as a significant improvement on health related quality of life when using videos as compared to pamphlets (Stellefson, Chaney, & Chaney, 2009). According to Stone, Holden, Knapic, and Ansell (1989), a study comparing the effectiveness of video and personalized teaching on anticoagulant therapy showed there were no differences in patients’ knowledge or long-term retention. However, using a DVD did offer some advantages to both health professionals and to patients.

Using audio-visual materials to teach psychomotor skills via role modeling is proven to be effective (Rhee et al., 2005). When using video materials, an opportunity exists for patients to identify with persons portrayed and the tasks they are performing (Murphy et al., 2000). Learning requires motivation and needs to appeal to patients. The DVD medium technologically offers more options for interaction and discovery (Lewis, Gunta, & Wong, 2002). While video cassette tapes have been used in diabetes education in clinics, hospitals, and private practice, a DVD would be innovative in this setting because of the potential for linkage to educational internet sources or for interactive learning, which is possible in this technological format.

In the learning process, information needs to be absorbed by learners at their own pace and in comfortable situations. The advent of video technology made this more possible. Early studies by Ward, Garlant, Paterson, Bone, and Hicks (1984) emphasized that motivation to learn and use knowledge by introducing video tapes into diabetes education would be more effective in proper, familiar settings like the patient’s home.
Today, using a DVD as an educational material allows patients to choose their own viewing time and for participants to share information in the home setting as opposed to a clinic (Lewis et al., 2002). It may allow patients to learn in a more personalized pace and in a comfortable setting with their family. Introducing visual materials regarding diabetic foot care information potentially helps patients increase knowledge and retention of that knowledge presented in the DVD materials. Viewing skin abnormalities on feet and simultaneously feeling their own feet while viewing a demonstrated examination on screen may help patients to model skills (Stellefson et al., 2009).

**Theoretical Framework**

The Theory of Reason Action (TRA) by Ajzen & Fishbein, The Social Learning Theory by Bandura and Self-Care Deficit Theory by Orem have been utilized in this study to support the use of DVDs in patient education. As mentioned earlier, any educational project must contain both teaching strategies and incorporate learning theories (Krathwohl, Bloom, & Masia, 1973). A theory is a set of concepts, definitions, relationships, assumptions, or propositions derived from models or from other disciples and project a purposive, systematic view of phenomena by designing specific interrelationship among concepts for the purpose of describing, explaining, predicting, and prescribing (Tomey & Alligood, 2002).

**The Theory of Reasoned Action**

The theory of reasoned action (TRA) states the best predictor of a patient's behavior is the patient's specific reason to behave that way. The person's expressed reason for action is a function of attitudes and social norms. In the TRA, attitudes are a
function of beliefs, normative beliefs (what I think others would or expect me to do), and motivation to comply (how important is it to me to do what I think others expect). A person who believes that performing a given behavior will lead to positive outcomes will hold a favorable attitude toward performing the behavior (Ajzen & Fishbein, 1980). Thus, an individual who believes that he/she should follow the advice of the healthcare professional regarding exercise to help manage diabetes will adhere to the regimen as opposed to the one who does not believe so. Variables, such as personal knowledge, level of anxiety, locus of control, age, education, and gender, influence a person’s interpretation of their environment and their beliefs (Ajzen & Fishbein, 1980; De Weerdt, Visser, Kok, & Van Der Veen, 1990).

The theory of reasoned action suggests that there are two main influences of intention. They are the attitude toward the behavior and subjective norms. This suggests that people think about the possible outcomes of a decision before making one. There is an attitude formed about the overall decision and the factors that influence the final behavior (Ajzen & Fishbein, 1980). The patient wants to purchase the shoes, but the cost of the shoes may negatively influence his decision to buy them, thus purchasing less expensive shoes which may eventually cause abrasions, leading to foot ulcers with significant negative consequences.

The second influence of a person’s intention is “subjective norms.” This comes from the person’s motivation to comply with what he believes specific individuals or groups think how he should or should not perform a specific behavior (Ajzen & Fishbein, 1980). What outside influencers will think of the decision and how important these
outside influencers are to the decision maker play a vital role in the subjective norms. This is why people sometimes consult with others before making decisions. For many, it is rare to make an important life decision quickly without consulting some one so that they feel they have made the most educated and best decision. As an example, if the diabetic patient has the support and help from his family who provide positive feedback regarding daily foot care, he/she will perform the task.

The Social Learning Theory

Understanding the learning process and the theories associated with this process is crucial to develop teaching programs. Bandura’s social learning theory (1977) reveals the effectiveness of modeling behavior on learning. Bandura’s theory states most human behavior is learned observationally through modeling; from observing others, one forms an idea of how new behaviors are performed. Modeling is a major method by which learning is achieved (Ormrod, 1999).

Replication and reproduction must occur as well: however, the most important aspect to learning is motivation (Ormrod, 1999). A learner must want to learn and recognize the need to learn specific information. Effective modeling occurs when there is attention, retention, motor reproduction, and motivation. First, the learner must focus attention and the information obtained must be retained and stored.

Bandura (1977) also emphasized the importance of self-efficacy in learning. He defines self-efficacy as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves, and behave
Self-efficacy affects learning in three ways: (1) choice of activities, (2) effort and persistence, and (3) learning and achievement (1997). Learning occurs when people have faith in their abilities and they need to believe that learning and new activities are obtainable for them. People with high self-efficacy tend to exert more effort, which results in adherence to persistent tasks. The achievement of a task and learning can encourage people to accomplish it successfully in the future.

The essence of deployment of self-efficacy for an individual is contained in their previous experiences combined with messages from others. An example of this is one of the most common and pervasive examples of social learning situations—television commercials. A commercial suggests drinking a certain beverage or using a particular hair shampoo will make us popular and win the admiration of attractive people. Depending upon the component processes involved, such as attention or motivation, one may model or take on the behavior in the commercial and buy the product being advertised.

*Bloom’s Taxonomy*

For decades, educational researchers have used Bloom’s Taxonomy to determine educational objectives (Krathwohl et al., 1973). Education of diabetes requires understanding of basic learning processes and a variety of learning modalities. According to Krathwohl et al. (1973), there are three learning domains: cognitive, affective, and psychomotor. Within the cognitive domain, learning can be characterized into six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. These range
from the lowest level of simple recognition to more complex and abstract levels (Krathwohl et al., 1973).

Bloom’s Taxonomy has specifically described objectives involving the affective domain. This can be included in healthcare educational goals in terms of the creation material which can act on affective levels of patients to inspire, motivate, or instill confidence (Krathwohl et al., 1973). The psychomotor domain has the greatest applicability in the education of diabetic foot care. It is here that tasks to be taught should reach higher cognitive levels under his classification to what he terms “Complex Overt Response.” This is the almost automatic performance of tasks with high degrees of accuracy.

Self-Care Deficit Theory of Nursing

Dorothea Orem’s self-care deficit theory also assists health care professionals in determining levels and approaches to patients’ care. Orem (1995) divided the professional nursing practice model into three systems: compensatory system, partially-compensatory system, and supportive-educative-development system. The self-care deficit theory guides health care professionals to examine relationships among nurses and patients in order to help patients achieve their self care goals. Orem describes the self-care theory of nursing as relations of self-care, self-care deficit, self-care demands, self-care agency, and nursing agency (Tomey & Alligood, 2002). She defined self-care as activities that are performed by mature individuals as means to maintain their own health and well-being (Tomey & Alligood, 2002). Supportive-development system provides a
model of nurses as a facilitator and acting as a consultant with patients’ participation and actions in order for the patient to be self sufficient in their health care.

Orem’s self-care deficit theory can be applied to foot care in diabetic patients because it describes and explains why people can be helped through nursing that brings about an awareness of their abilities. The importance of self care is demonstrated, promoting patient control of personal care, which can greatly improve conditions and reduce risks of diseases. This allows empowerment of patients as they recognize their ability to influence their health. For example, teaching daily foot care is one area of knowledge where nurses and nurse practitioners can focus in order to prevent devastating consequences to patients’ health. Foot care is simple and detecting abnormalities on one’s own feet is not difficult if it is done in a timely manner and the patient has the knowledge and visual clues. Since foot care requires visual recognition and psychomotor skills: pictures and demonstrations might seem the preferable educational modalities. Consideration must still be given for the varied educational and functional levels found in and among diabetic patients.

With a diagnosis of diabetes, patients experience life style changes and learning on an on-going basis. Most diabetic patients understand the need for new learning and life-style changes; however, the failure to achieve learning goals and the overwhelming amount of information can intimidate patients and reduce their self-efficacy. (Aljasem et al, 2001) (Aljasem, Peyrot, Wissow, and Rubin (2001), in a study involving diabetics' barriers to treatment and self-efficacy, showed that people who perform self-care are more confident in the implementation of tasks and are more likely to adhere to their
treatment and self-monitoring. Developing self-efficacy through achievable tasks and incorporating simple actions into their daily lives helps with their concrete learning and motivation for further learning.

Summary

There has been a considerable body of research on education for diabetic patients, especially dealing with insulin control, diet, and exercise (Walker & Wylie-Rosett, 2001). Other more specific research on educational goals has been done with an examination of interventions, such as individualized instruction, teaching methods in clinical and outpatient settings, and follow-up interventions (Lavery et al., 2003). Less attention has been paid to the modality of instructional materials matched to the nature of the simple psychomotor tasks being taught. Educational theories seem to support the idea that psychomotor tasks, such as those in diabetic foot care, seem more suited to demonstration whether live or recorded. Research on the efficacy of newer technologies, such as the use of DVD, CD-ROM, and computerized interactive kiosks in health care settings for patient education is only now beginning. As these technologies become both less expensive and more widely available, research on their applications is warranted.

In the present study, the use of written materials was contrasted with the use of audio-visual DVD materials to examine whether the modality of the teaching materials was a factor in more positive learning outcomes for diabetic foot care. This study measured learning outcomes on diabetic foot care tasks comparing groups receiving educational materials on foot care in a written format, in a DVD format, or with both types of materials.
Chapter 3

METHODOLOGY

Introduction

The education of patients in health care remains a challenging task for numerous reasons, not the least of which is a lack of significant studies that incorporate education and learning theories in the reduction of foot problems for patients with diabetes mellitus type 2 (DM II). For the education of diabetic patients, this remains particularly important with the increased number of DM II cases world-wide. Yet, it has been demonstrated that certain teaching techniques of patients’ education have greater efficacy and impact to prevent or prolong occurrences of serious complications of diabetes. Foot care is one of the activities that a diabetic person needs to obtain a simple mastery to prevent foot ulcers and other serious complications. Daily inspection of the feet with appropriate care is needed to maintain foot health throughout their lives (Funnell & Anderson, 2004).

For diabetic foot care education, it may be a matter of spending an increased amount at the outset to avoid more costly complications. Additionally, since health care resources are not always equally allocated through society, other issues of distribution and availability come into question. Tailored educational materials for individuals and multiple approaches for teaching have been discussed. One challenge facing health care professionals would be the cost of DVDs and allocation of these resources to the increasing numbers of diabetic patients.

The purpose of this study is to evaluate the use of an audio visual teaching DVD versus written material and the effect on diabetic foot care. In order to evaluate teaching
methods utilizing the DVD, the research question will determine effectiveness of the DVD in foot care as opposed to other modalities. The basic research question is: Will the use of an audio-visual format to teach psychomotor skills, such as those used for diabetic foot care, increase the ability of patients to perform foot care more than using a written format? Implications of such a basic finding have wider applications in facilitating educational strategies for providers of diabetic care since written materials are typically less expensive to produce and distribute in comparison to audio-visual media such as DVDs.

*Population*

This study was performed in two separate urban areas in family practice clinical settings. The interviews were conducted with the diabetic patients at either the clinic or the subjects’ houses. Family members and friends of subjects were invited to interviews as subjects desired.

*Sampling*

Subjects in the current study were residents of the Sacramento and Stockton metropolitan areas and were referred by their primary physicians for participation in the study. Subjects were first screened for suitability for this study. Inclusion criteria included diagnosis for longer than three years and within the ages of 18 to 80 years. Subjects had no severe diabetes complications affecting their feet, such as current ulcers, vascular diagnosis, or prior amputation. There was no attempt to screen for educational level or socio-economic status. These clinics accepted a variety of health care payment plans, Medi-Cal, Medi-Care, and Health Plan of San Joaquin. Several articles (CDC,
2003; CDC, 2005; CDC, 2006; CDC, 2007) were reviewed and evaluated to define demographic parameters for subject selection. Fifty percent of the subjects’ primary language was Spanish and the other 50% were English speaking. The 30 subjects were randomly assigned into the experimental groups.

Procedures

The three experimental groups were created by the form of educational materials presented to subjects. Group 1 subjects were given a simple, one page paper pamphlet of written material on diabetic foot care. Group 2 subjects were given a DVD and poster on diabetic foot care which featured demonstrations of techniques and visual examples of abnormalities of the foot without any additional teaching on written material. Group 3 subjects were given the same DVD, with the aforementioned poster and written materials as well. A pre-test of knowledge on diabetic foot care was given to all subjects prior to them receiving any educational materials. All subjects were prompted to view the education materials weekly for a one month period of time, and then the post-test was administered. The post-test was done in the individual’s home. Both the pre- and post-tests were developed from summaries of the key points of all educational materials regardless of format. Subjects were provided with standardized explanations of the research purposes and procedures in either English or Spanish before initiating the study. Subjects signed a consent form and agreed to a follow-up visit in their homes or clinic. As a measure of post-test skill, both evaluations of the written post-tests and researcher observations of performance of skills were used.
Ethics

This study was submitted to the Division of Nursing, California State University Sacramento Human Subjects Committee and approved. The consent was obtained by individual participants after a verbal explanation of the study, the provision of allowing them to keep all materials, and accommodating follow-up appointments for their circumstances and refusals. The information obtained for this study is kept anonymous and all information received is kept confidential in a safe for over five years.

Intervention Tool

Several pre-existing educational DVDs on diabetic foot care from different companies were reviewed for this study. The one chosen for this study was *Preventing Diabetic Foot Ulcers: The 3-Step Program* produced by the Family Health Media (2005). Parameters involved in DVD selection included length of time, use of good visual graphics and cues, and the use of simple language. This DVD is 20 minutes in length and identifies three steps to help prevent diabetic foot ulcers. First, patients learn how to do a daily foot exam and teaches them learn what to look for when they check their feet. Pictures are shown of common diabetic foot problems and the important warning signs and when to contact their primary care provider. Finally, the DVD shows why wearing doctor-recommended shoes fit by a professional is so important (Family Health Media, 2005).

A total of thirty DVDs were purchased from the Family Health Media Company. Fifteen of these DVDs were in Spanish and 15 were in English. The DVD had well
illustrated visuals of diabetic foot ulcers and good demonstrations of how to perform daily diabetic foot care.

The educational pamphlet on diabetic foot care was constructed by the researchers as a one-page type-written paper without any pictures or illustrations or step-by-step guide for daily foot inspection. It contained only descriptions of tasks involved in foot care and statements regarding the necessity of performing them. The most important diabetic foot care education tasks mentioned were daily inspection, appropriate care, early detection of abnormalities, and the seeking of professional attention in a timely manner (Ahroni, 1993). The pamphlet was also translated into Spanish and reviewed by native Spanish speakers. A poster was also used and distributed to the third group. The poster contained pictures of healthy feet with no cracks or redness between the toes, toenails were cut straight and across, and smooth skin with no breaks. The poster also showed pictures of dangers signs, such as hammer toes, bunions, small cuts and scratches, dry skin, and infection.

**Evaluation Tools**

The demographic survey included questions on age, gender, ethnicity, and education. The demographic data were reflected by the demographic data from statistics from the National Institute of Health from 2008. Additional questions asked were how often patient’s check their blood sugar, how often they check their feet, and what would they do if they developed an infection (NIH, 2008).

A 12-item Foot Care Confidence Scale was developed to measure the patient’s capability to perform protective foot care behavior using an existing tool, the Foot Care
Confidence Scale, (Sloan, 2002) as a model. The pre and post test was developed in a revised form from the Foot Care Confidence Scale that was used in researching a cross-sectional study on the association between foot care self-efficacy beliefs and actual foot care behavior in people with peripheral neuropathy. Two aspects of actual foot care, preventative behavior and actual foot care beliefs, were evaluated using this scale (Sloan, 2002).
Chapter 4

PRESENTATION OF DATA

Introduction

The research data presented consist of a description of the study participants, statistical analysis, and a report of findings that are based on the following research question: Is the use of DVDs more effective as a teaching tool than written materials in diabetic foot care education?

Study Participants

In this study, an attempt was made to sample a variety of patients within given parameters of the diabetes mellitus type 2 (DM II) disease process. What follows is a demographic description of study participants in graphic form. The variables noted are gender (see Table 1), ethnicity (see Table 2), age (see Table 3), and educational level (see Table 4).

Table 1

<table>
<thead>
<tr>
<th>Gender</th>
<th>Spanish Speaking Patients</th>
<th>English Speaking Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Patients</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Males</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Females</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>
### Table 2

*Ethnicity*

<table>
<thead>
<tr>
<th>Race</th>
<th>Spanish Speaking Patients</th>
<th>English Speaking Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexican American</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Caucasian</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>African American</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>American Indian</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 3

*Age Group*

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Spanish Speaking Patients</th>
<th>English Speaking Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 – 30</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>31 – 40</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>41 – 50</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>51 – 60</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>61 – 70</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>71 – 80</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 4

*Educational Level*

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>Spanish Speaking Patients</th>
<th>English Speaking Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>No School</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Elementary School</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Middle School</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>High School</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>College</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

*Educational Level*

This section assesses if the teaching methods worked differently on different educational groups. The variable for educational level is defined in the following categories: no education, elementary education, middle school education, high school education, and college education. With only one subject having no education, there is not sufficient variation in the literacy variable to assess its effect on the teaching methods or the knowledge base of the participants.

To determine if the intervention effect varied across educational levels, a one-way analysis of variance (ANOVA) of the mean difference in gain scores across the educational categories was conducted. In Group 1 (written material only), there was no significant difference in gain scores across educational categories. This means that
change in the knowledge base of participants of the Group 1 did not vary with the educational level of subjects. In other words, the written method did not work differently across educational groups. Group 2 (DVD plus poster) showed no significant knowledge gain across educational categories. This means that change in the knowledge base of participants of the Group 2 participants did not depend on their education level. The DVD approach did not work differently across educational groups.

Group 3 gain scores did not demonstrate any significant difference across educational categories. This means that the use of the DVD/poster/written method did not bring significant change to the knowledge-base of the group three participants regarding foot care treatment across educational categories.

**Statistical Analyses**

The data were subjected to one-sample t-tests for each of the three intervention groups. There was no statistical significance for Group 1 pre- and post-test knowledge scores. This means that the written method did not significantly change the knowledge base of the Group 1 participants regarding foot care treatment.

The scores for Group 2 (DVD and poster) approached significance ($p = .057$); however, there was not a significant difference in the pre- and post-test scores for this group. This means that the DVD method did not change the knowledge base of the Group 2 participants regarding foot care treatment.
In Table 5 the difference variable is zero; therefore, the null thesis could not be rejected. The P value is slightly higher than the acceptable level of significance, 0.05. This means that the DVD material did not change the knowledge base of group two.

Table 6

One-Sample Test (DVD/Poster/Written)

| posttest_pretest_diff | 2.236 | 9 | .052 | .50000 | -.0058 | 1.0058 |

The results in Table 6 show that the null hypothesis the difference variable is zero and is rejected. The mean value of the difference variable is 0.5-significantly higher than zero. It can be concluded that the DVD/poster/written material approach worked well on Group 3 in regards to changing their knowledge base.
In order to determine if the primary language had differences in effect, an independent sample \( t \)-test was conducted to test for the equality of the differences in the mean scores between the Spanish and English-speaking patients. There was no significant difference for Group 1 (written material only) scores for Spanish and English speaking patients. The result suggests that the written method did not work differently between the English and Spanish-speaking patients. While Group 2 (DVD plus poster) results were not significant between English and Spanish-speaking patients, the results approached significance \( (p = .07) \). Group 3 (DVD & written materials) also did not demonstrate a significant difference between English and Spanish-speaking patients. The data gathered in this study were also used to explore whether the effectiveness noted with the Group 3 educational materials is demonstrable across educational level and primary language (English or Spanish).

**Discussion**

The analyses failed to support the hypothesis that an audiovisual format for educational materials would positively impact the learning of diabetic foot care as opposed to approaches using written materials. A surprising result, however, showed that a combination of DVD and written materials approached significance.

**Summary**

The DVD appears to have positively impacted the acquisition of new skills with regard to learning diabetic foot care tasks and procedures when combined with written materials. No significant intervention effects could be demonstrated with the addition of DVD materials only, thus learning effects did not demonstrate a significant difference.
Unexpectedly, the control group with only written materials showed no significant learning effect-indicating no improvement in subjects' performance. Group 3, in which subjects were given DVD/poster/written materials, showed some gains in knowledge of foot care.
Chapter 5

CONCLUSION

Introduction

Despite previous research (Hall, 2009) which suggested psychomotor skills, such as those involved in foot care of diabetes mellitus type 2 (DM II), are taught better in formats that incorporate many audiovisual cues, or that purely written materials may not be best suited for the teaching of these kinds of skills (Wingard, 2005), the present study did not demonstrate this to be the case regarding education of diabetic foot care. From this study, only subject groups exposed to a combination of written and audiovisual materials showed gains in a positive direction.

The explanation for this result is less clear. The questions that arise for further consideration involve determination of whether the presentation format of teaching materials (written or DVD), or the quantity or combination of materials proves to be superior in patient education. The simplest explanation involves the nature of the task being taught. Previous research suggested that skills which are essentially psychomotor tasks, such as diabetic foot care, are perhaps best taught by example provided from demonstrations in a DVD (Mead, McKinney, & Barnes, 1994). Written materials, even with simple illustrations, appear less appropriate for the teaching and learning of these skills (Davis et al., 1990). Multi-disciplinary research (Murphy et al., 2000) has shown this to be the case and a similar conclusion is supported from this research. The actual demonstrated improvement utilizing multiple formats of educational materials could
prove valuable for further research and would merit further study, specifically on effects of DVDs as educational tools in nursing education.

*Teaching in Nursing*

Patient education has long been a primary focus of nursing. For nurses, the assessment of patients’ needs for education regarding their own self-care remains fundamental and is one of the most important roles of nurses (Hall, 2009; Wingard, 2005). With this established, and noting the high incidence of DM II and the problems associated with this disease, foot care education should be given to all diabetic patients. This information, combined with patients’ efforts may lead to improving patients' frequency and quality of foot care and surveillance. Evaluation of the feet to monitor health or problems can lead to early detection and intervention of foot problems associated with DM II, including the amputation of feet or limbs. This in turn may decrease the cost to the patient and society. The overall effect may be an improvement in the patient’s quality of life.

Presenting information in a manner suited to patients and on many levels or types is essential to educate patients (Hall, 2009; Wingard, 2005). However, in the changing face of health care delivery, nurses are more hard pressed than ever for the time it takes to make these kinds of assessments and implementations of educational nursing goals. Concurrently, the variety in patients served with a variety of cultural and educational backgrounds, as well as language differences, complicates this task. The need to rely on educational aids which save time and are more effective teaching tools is needed. With the advent of technological advances in the form of computers and DVD players, a new
avenue has become available which is being implemented in health care settings. Health professionals will ultimately benefit by having these tools available as an adjunct to their patient education, saving them time as well as aiding in shaping the behavior of their patients for preventative care.

Foot care is relatively simple, but it involves psychomotor tasks. These tasks or skills lend themselves more readily to visual teaching materials provided in a video (DVD) presentation. A DVD brought forth in many languages may help reduce difficulties surrounding limitations of reading, as well as language, cultural, and patient literacy levels. A final consideration is cost. A DVD can be far less expensive to produce than paper based materials. If educational materials are created in this form, or the related format of CD-ROM, they can be more easily up-dated or even linked to educational websites.

Many of the tasks nurses are required to teach patients, such as wound care, blood glucose monitoring, and foot care in diabetes, are largely psychomotor in nature and lend themselves to these teaching modalities (Borges & Ostwald, 2008). Research on the applications of these technologies is only just begun. Ultimately, advances in technology have changed and will continue to change the practice of health care and utilizing various teaching tools is part of the delivery.

Patient education remains crucial because it directly influences health outcomes for patients and may delay or avoid serious complications. Technology-based teaching can be one more tool for health practitioners to obtain these goals and should be utilized to the fullest extent. Patients themselves are already familiar with tools such as
computers, CD-ROMs, and DVDs. Another aspect of using audio-visual education is that it allows of patients to practice self-management of their disease. This type of education serves the dual purpose of risk reduction and provides patients with the use of on-going tools of empowerment and self-management of their disease (Funnell & Anderson, 2004).

**Limitations**

This study used a simple demonstration to compare two types of educational materials for the teaching of relatively simple psychomotor tasks in diabetic foot care. Studies, such as these, are useful indicators of the applicability and efficacy of educational principals. The most salient limitations of this study include a limited sample size and lack of randomization. A much larger sample size would be clearly indicated to draw more valid inferences to the larger population. Larger sample sizes may well have reached the significance that was approached in the study, which indicated the need for further study to demonstrate the intervention efficacy.

Another difficulty is quantifying exposures to educational materials to control for practice effects from repeated exposures. Subjects in the current study were given the option of reviewing materials as often as they liked in the time between pre- and post-tests of skills.

Another limitation in this study involved the lack of randomized sampling of subjects which would allow inferences to wider populations. Obtaining permission and consents from subjects presents a type of bias which is certainly an issue for this study.
Lastly, a limitation involved the written materials that were self-generated by the researchers. A more comprehensive study, with the potential for greater validity, would have utilized several standard publications used in the education of diabetic foot care currently in clinics and health care settings across the nation. Additionally, other DVDs on the subject of diabetic foot care education could have been used to avoid the effects of single sampling and demonstrate the efficacy on a much wider scale. Given these limitations, the current study could be seen as a pilot study, thus indicating the need for further research. Another limitation might be that the health care provider gave no additional information and/or reinforced the learning materials.

Discussion of Further Research

In patient education regarding diabetic foot care, the current study revealed evidence that patient learning was positively impacted when both audio-visual and written materials were presented to the patients. In this study, materials were provided in both English and Spanish, depending on each patient’s primary language. The learning effect was also clearly demonstrated individually by the patient’s primary language, patients were able to perform daily foot care and follow instructions. When educational materials of both written and audio-visual were presented to the subjects in their primary language, the learning effect was demonstrated in group 3. This seems to support the assertion that learning tasks of a psychomotor nature does not need to rely on verbal or written instructions as much as demonstrative techniques such as those provided by the DVD presentation.
Additional studies featuring a larger sample with an increased number of primary languages might show similar results. This has implications for nurses and other health care providers in settings that include a variety of languages present in the patient populations. Although DVDs can include alternative language options, providing the basic instructions in formats which place less emphasis on the written and verbal content could perhaps achieve learning goals despite language differences.

For further study, other variables such as age, educational level, literacy level, age, cultural backgrounds, and languages of subjects would be necessary to fully evaluate modalities used in teaching and patient education. All of these variables may have influences which can be explored in further research.

Assessing literacy levels of individuals is crucial for successful teaching. Wallace et al. (2009) revealed literacy-level appropriate patient education with self-management support package, and individual consultation would be necessary for self-management at home with diabetic patients. Also, appropriate educational material should be available for subjects with low literacy levels. In addition, the educational levels of subjects may show greater reliance on less verbal and less abstract form of educational materials. Positive learning outcomes for the tasks were demonstrated in the three groups independent of educational levels of the subjects. This is an important consideration for the teaching of any skills in health care settings.

Another area of research would take into account cross-cultural factors which might influence learning styles in the populations studied. Using a DVD as a teaching tool may offer advantages when faced with diversity in educational levels, language, and
culture. It would also have advantages addressing the visual changes that are seen in the diabetic patient. These findings make the case for the appropriateness of audio-visual materials for the teaching skills across many different psycho-social boundaries. Costs of these materials are decreasing. The traditional reliance on written materials seems less indicated and doubly so when these materials are demonstrated to be less effective, as in the case of diabetic foot care.

**Summary**

In this study, the combination of DVD and written educational materials provided information showing patients improved their foot care and reveals to health care providers that patients learn best when exposed to information through many channels. Neither a written approach nor an audiovisual approach will, in isolation, provide enough learning gains for patients. Combining differing teaching modalities, regardless of the patient’s language, is an important finding for those suffering from DM II and other health care challenges. Further research on other variables, like age, literacy level and cultural background, is warranted.

No two patients are alike, nor will they learn in exactly the same manner. In the matter of diabetic foot care, which is so important for these patients, all efforts should be made to maximize diabetic education, especially foot care. It is incumbent on health care providers to help their patients avoid the costly consequences of not performing such simple preventative measures. To this end, knowledge of the best method to teach these same measures is fundamental. This study provided some insight into this important aspect of patient care.
APPENDIX A
Survey (English)

1. Gender:
   □ Male    □ Female

2. Age:
   □ 18-30 □ 31-40 □ 41-50 □ 51-60 □ 61-70 □ 71-80

3. Ethnicity:
   □ Caucasian □ African American □ American Indian or Alaskan Native
   □ Native Hawaiian or other Pacific Islander □ Hispanic or Latino □ Other

4. Education
   □ Elementary □ Middle School □ High School □ College Graduate

5. How do you control your blood sugar/diabetes?
   □ Via insulin (injection) □ Pills (oral glucose control) □ Diet control
   □ More than one of the above

6. How often do you check your blood sugar?
   □ None □ daily □ 1 time per week □ 3 times per week □ 4 or more times per week

7. How many times during the week do you check your feet?
   □ 1 time per day □ 3 times per week □ 2 times per week □ 1 or fewer times per week

8. What would you do if you developed an infection on your foot?
   □ Treat at home □ Go to the doctor

9. Keeping your blood sugar/diabetes controlled on a regular basis can lower your risk of damage to the nerves in your feet.
   □ True □ False □ Don’t know
10. Diabetic patients are more likely to suffer from poor blood supply to their feet.
   □ True  □ False  □ Don’t know

11. Regular examination of your feet is recommended to check for nerve damage.
   □ True  □ False  □ Don’t know

12. Infections clear up or heal as quickly in diabetics as they do in non diabetics.
   □ True  □ False  □ Don’t know

13. Cuts and scratches take longer to heal if you have diabetes.
   □ True  □ False  □ Don’t know

14. Because you have diabetes, your feet need to be checked for discoloration, infections, corns or injuries of any type:
   a. by you or someone else once a day  □ True □ False □ Don’t know
   b. while breaking in new shoes.        □ True □ False □ Don’t know
   c. whenever you feel any discomfort.  □ True □ False □ Don’t know
   d. only if you have had foot problems in the past □ True □ False □ Don’t know

15. It is advisable to cut or file your toenails:
   a. straight across                   □ True □ False □ Don’t know
   b. to the shape of your toe          □ True □ False □ Don’t know

16. Foot problems such as blisters, corns or tough nails can safely be treated by:
   a. a podiatrist                     □ True □ False □ Don’t know
   b. yourself                        □ True □ False □ Don’t know
   c. anyone                          □ True □ False □ Don’t know

17. Soaking your feet for at least 10 minutes helps to deal with painful, hard skin.
   □ True  □ False  □ Don’t know
18. The type of shoes recommended for a person with diabetes include:
   a. Lace-up □ True □ False □ Don’t know
   b. Velcro straps □ True □ False □ Don’t know
   c. High heels □ True □ False □ Don’t know
   d. Open toed shoes □ True □ False □ Don’t know
   e. No shoes at all □ True □ False □ Don’t know

19. It is recommended to regularly wash your feet in hot, soapy water
   □ True □ False □ Don’t know

20. It is recommended to apply lotion on both feet if you have dry skin except in between the toes.
   □ True □ False □ Don’t know

21. Is very important for all diabetic patients to have information regarding foot care to prevent foot complications.
   □ True □ False □ Don’t know
APPENDIX B
Survey (Spanish)

1. Sexo:
   □ Hombre   □ Mujer

2. Edad:
   □ 18-30   □ 31-40   □ 41-50   □ 51-60   □ 61-70   □ 71-80

3. Origen Etnico:
   □ Raza Blanca   □ Africano Americano   □ Indio Americano o Nativo de Alaska
   □ Hawaiano o de las Islas Pacíficas   □ Hispano o Latino   □ de otra nacionalidad

4. Educacion
   □ Primaria   □ Primaria grados   □ Secundaria   □ Universidad 7,8,9

5. Como controla su azucar/Diabetes?
   □ Con inyecciones de insulina   □ Pildoras   □ Dieta   □ Mas de una de estas tres cosas

6. Cuantas veces al dia o por semana se chequea su azucar?
   □ Nunca   □ Diariamente   □ 1 vez por semana   □ 3 veces a la semana   □ 4 o mas veces a la semana

7. Cuantas veces por semana se chequea sus pies?
   □ 1 vez al dia   □ 3 veces a la semana   □ 2 veces por semana   □ 1 o menos veces por semana

8. Que haria si desarrollara una infeccion en su pie?
   □ Lo curaria en casa   □ Iria al medico

9. Mantener la azucar/Diabetes en su sangre regularmente controlada puede bajar los riesgos de daños en los nervios de sus pies.
   □ Cierro   □ Falso   □ No se
10. Diabeticos sufren mas de pobre circulacion en sus pies
   □ Cierto  □ Falso  □ No se

11. Se recomienda examinacion de sus pies con regularidad para chequear daños en los nervios de los pies.
   □ Cierto  □ Falso  □ No se

12. Infecciones se sanan rapidamente en diabeticos haci lo mismo como en personas que no son diabeticos.
   □ Cierto  □ Falso  □ No se

   □ Cierto  □ Falso  □ No se

14. Porque usted es Diabetico, tiene que chequear sus pies por manchas, infecciones, callos, o cualquier herida:
   a. Por usted o otra persona diariamente □ Cierto □ Falso □ No se
   b. Cuando uso mis nuevos zapatos □ Cierto □ Falso □ No se
   c. Cualquier tiempo cuando me duelen los pies □ Cierto □ Falso □ No se
   d. Solo si en el pasado tenia problemas en mis pies □ Cierto □ Falso □ No se

15. Se recomienda que se corte o lime las uñas de sus dedos:
   a. En linea recta □ Cierto □ Falso □ No se
   b. En la forma de sus dedos □ Cierto □ Falso □ No se

16. Problemas de pies como ampollas, callos, o uñeros pueden ser tratados por:
   a. Un podiatra □ Cierto □ Falso □ No se
   b. Usted □ Cierto □ Falso □ No se
   c. Cualquier persona □ Cierto □ Falso □ No se
17. Remojar sus pies en agua tibia por 10 minutos ayuda a suavizar la piel dura y dolorosa.

□ Ciento  □ Falso  □ No se

18. El tipo de zapatos que se recomiendan para las personas diabéticas son de:

   a. Cintas  □ Ciento  □ Falso □ No se
   b. Correa de Velcro  □ Ciento  □ Falso □ No se
   c. Zapatos Altos  □ Ciento  □ Falso □ No se
   d. Zapatos Abiertos  □ Ciento  □ Falso □ No se
   e. Descalzo  □ Ciento  □ Falso □ No se

19. Se recomienda que se remoje sus pies regularmente en agua caliente y jabonosa.

□ Ciento  □ Falso  □ No se

20. Se recomienda que se aplique loción en sus pies excepto entre los dedos de sus pies si tiene la piel seca.

□ Ciento  □ Falso  □ No se

21. Es muy importante para todo paciente diabético que tenga información sobre el cuidado de sus pies para prevenir complicaciones en los pies.

□ Ciento  □ Falso  □ No se
APPENDIX C

Consent Form

You are being asked to participate in a research study which will be conducted by Irma F. Rymers and Akiko Shimada at California State University Sacramento Division of Nursing. The purpose of the study is to evaluate the efficacy of the audio-visual teaching material for the diabetic foot care. This study may be beneficial for the diabetic patients to prevent further foot complications.

You will be given the audio-visual tape that you will need to watch at home as many times as you can in a period of one month. After a month, the researchers will visit you at your home to evaluate how beneficial the tape has been to you. During the visit, the participants will be asked to fill out the survey and demonstrate how you take care of your feet. Some patients will be given only the written material and not the DVD for purpose of the research study.

This research project is safe but may cause feelings of discomfort if not following diabetic regimen as prescribed. You may personally benefit from watching the audio-visual tape.

Any personal information given by you will be kept confidential. However, the results of the study as a whole may be shared with the medical community and become a matter of public records. Because of your participation and time in this study, you are welcome to keep the audio-visual DVD. Physician’s permission will be acquired in clinic to do the study.

If you have any question about this research, you may contact Irma F. Rymers at (209)952-5649 and Akiko Shimada at (916) 638-6779.

You may decline to be a participant in this study, without any consequences. Your signature below indicates that you have read this page and agree to participate in the research.

____________________________________
Signature of participant
APPENDIX D

Forma de Consentimiento

Le pedimos que participe en esta investigación que será conducida por Irma F. Rymers y Akiko Shimada que son estudiantes de la Universidad de Sacramento en el estado de California en la división de enfermería. La razón de este estudio es para evaluar un DVD o película que enseña el cuidado de pies en una persona con diabetes. Este estudio será de mucho beneficio para una persona con diabetes para prevenir complicaciones con sus pies.

Le daremos el DVD para que lo vea en casa. En la clínica llenará una encuesta antes de ver el DVD. Después de un mes, una de las investigadoras le visitará en su casa para evaluar si el DVD fue de beneficio para usted. Durante la visita, el participante necesitará llenar una encuesta y también mostrar cómo se debe cuidar sus pies para prevenir complicaciones.

Esta investigación no lleva nada de peligro ni riesgo con su salud. Usted puede beneficiarse personalmente al ver este DVD.

Cualquier información que usted nos dé, se mantendrá completamente confidencial. Los resultados de este estudio pueden ser compartidos con la comunidad científica y pueden estar en algunos documentos públicos, pero su nombre no será revelado. Le regalaremos este DVD por haber participado en este estudio.

Si usted tiene alguna pregunta acerca de esta investigación, usted puede comunicarse con Irma F. Rymers al (209) 952-5649 o Akiko Shimada al (916) 638-6779.

Usted es libre de no participar en este estudio y no habrá ninguna mala consecuencia. Su firma en la parte de abajo indica que ha leído esta forma y está de acuerdo en participar en esta investigación.

______________________________
Firma de el participante
APPENDIX E

Pre and Post Test (English)

<table>
<thead>
<tr>
<th>pre</th>
<th>Check items</th>
<th>post</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ yes</td>
<td>Able to perform foot care using lotion to dry out skin if needed.</td>
<td>□ no</td>
</tr>
<tr>
<td>□ no</td>
<td>Able to use equipment (clippers, mirror, lotion)</td>
<td></td>
</tr>
<tr>
<td>□ yes</td>
<td>Able to inspect feet completely to identify signs of abnormalities.</td>
<td></td>
</tr>
<tr>
<td>□ no</td>
<td>Skin on feet is smooth, dry, and intact</td>
<td></td>
</tr>
<tr>
<td>□ yes</td>
<td>Able to recognize signs of infection (redness, swelling, purulent discharge from open sore).</td>
<td></td>
</tr>
<tr>
<td>□ no</td>
<td>Toenails are properly trimmed and feet are clean</td>
<td></td>
</tr>
<tr>
<td>□ yes</td>
<td>Wears foot protection in the home environment</td>
<td></td>
</tr>
<tr>
<td>□ no</td>
<td>Wears protective shoes on a daily basis</td>
<td></td>
</tr>
</tbody>
</table>
Diabetic Foot Care

Self-Care at Home

- Foot examination: Examine your feet daily and also after any trauma, no matter how minor, to your feet. Report any abnormalities to your physician. Use a water-based moisturizer every day (but not between your toes) to prevent dry skin and cracking. Wear cotton or wool socks. Avoid elastic socks and hosiery because they may impair circulation.

- Eliminate obstacles: Move or remove any items you are likely to trip over or bump your feet on. Keep clutter on the floor picked up. Light the pathways used at night—indoors and outdoors.

- Toenail trimming: Always cut your nails with a safety clipper, never use scissors. Cut them straight across and leave plenty of room out from the nailbed or quick. If you have difficulty with your vision or using your hands, let your doctor do it for you or train a family member how to do it safely.

- Footwear: Wear sturdy, comfortable shoes whenever feasible to protect your feet. To be sure your shoes fit properly, see a podiatrist (foot doctor) for fitting recommendations or shop at shoe stores specializing in fitting diabetics. Your endocrinologist (diabetes specialist) can provide you with a referral for a podiatrist or orthopedist that may also be an excellent resource for finding local shoe stores. If you have flat feet, bunions, or hammertoes, you may need prescription shoes or shoe inserts.

- Exercise: Regular exercise will improve bone and joint health in your feet and legs, improve circulation to your legs, and will also help to stabilize your blood sugar levels. Consult your physician prior to beginning any exercise program.

- Smoking: If you smoke any form of tobacco, quitting can be one of the best things you can do to prevent problems with your feet. Smoking accelerates damage to blood vessels, especially small blood vessels leading to poor circulation, which is a major risk factor for foot infections and ultimately amputations.

- Diabetes control: Following a reasonable diet, taking your medications, checking your blood sugar regularly, exercising regularly, and maintaining good communication with your physician are essential in keeping your diabetes under
control. Consistent long-term blood sugar control to near normal levels can greatly lower the risk of damage to your nerves, kidneys, eyes, and blood vessels.
APPENDIX G

Educational Material (Spanish)

Cuidado de el pie diabetico

Cuidado de sus pies en Casa

- Examinacion de sus pies: Examine sus pies diariamente y también cuando se lastime sus pies, no importa que pequeña es la lesión en sus pies. Reporte cualquier anormalidad a su doctor. Utilice un jabón suave y agua tibia para lavarse los pies todos los días, sequélos bien. Use una loción con base de agua todos los días (pero no entre los dedos de los pies) para prevenir la piel seca y rajaduras. Use calcetines de algodón y de lana. No use calcetines o medias con elástico porque pueden reducir su circulación.

- Elimine obstáculos: Mueva o quite cualquier objeto que obstruye su camino o puede causar que se tropiece y lastime sus pies. Levante objetos que estan tirados en el piso para prevenir accidentes y caídas. Mantenga buena luz en los pacios de adentro y fuera de casa.

- Corte de uñas: siempre corte sus uñas con un corta uñas. Nunca utilice cuchilla ni tijeras. Cortese las uñas en línea recta. No las recorte demasiado o penetrando mucho en las esquinas. Si usted tiene problemas con su vista o sus manos, vea a un médico especialista de los pies (podiatra) para que le corte las uñas, le quite los callos y las callosidades. Puede también entrenar a un miembro de su familia para que le corte las uñas de sus pies con mucho cuidado.

- Zapatos: Póngase zapatos que le sean cómodos y le queden bien. Los zapatos de cuero o de lona son los mejores. Sacuda los zapatos y toquelos en la parte interior antes de ponérselos. Verifique que no haya objetos, partes rotas ni otras cosas que puedan hacerle daño a los pies. No ande descalzo, Evite el uso de zapatillas que rocen entre los dedos así como zapatos plásticos. Si los zapatos no le quedan comodos o le ocasionan enrojecimiento en algunas partes, callos o ampollas, no se los ponga. Para que usted se asegure que los zapatos le sean cómodos consulte con un podiatra (el doctor especialista en los pies), compruebe sus zapatos en tiendas que se especializan en zapatos para los diabéticos. Su doctor puede referirlo a un podiatra o ortopedista, ellos recomendaran tiendas que se especializan en zapatos para diabéticos. Su endocrinólogo (el especialista en Diabetes) puede darle información de tiendas que se especializan en zapatos para diabéticos. Si tiene pies planos o dedos de martillo, necesitaran una receta para zapatos de diabéticos.
• Ejercicio: Ejercicio regular puede mejorar la circulación de la sangre a los pies y a las piernas y también ayudará a estabilizar los niveles de azúcar en la sangre. Consulte con su doctor antes de empezar una rutina de ejercicio.

• Fumar: si usted fuma, déje de hacerlo. El fumar reduce la circulación de sangre a los pies, especialmente los vasos sanguíneos. La circulación insuficiente de la sangre implica mayor riesgo de infección y finalmente amputación de los pies. Llame a su médico si una cortadura o rasguño no empieza a sanar en un día. Llame también si nota alguna de estas señales de infección, enrojecimiento, hinchazón, pus, calor, latidos.

• El control de la Diabetes: Siga una dieta para diabéticos, tome su medicina diariamente, mida y registre sus niveles de azúcar en la sangre con regularidad. Utilice los resultados para mantener el azúcar en la sangre cerca de lo normal, haga ejercicios regularmente, y mantenga buena comunicación con su doctor estas son importantes maneras de mantener su azúcar cerca de lo normal. Manteniendo su nivel normal de azúcar en la sangre puede ayudar a disminuir los riesgos de daños en los nervios, riñones, ojos y vasos sanguíneos.
APPENDIX H

Foot Care Confidence Scale

1. Overall knowledge of foot care
2. Inspect feet
3. Dry between the toes
4. Doctor trim toenails
5. Trim own toenails
6. Judge to use pumice
7. Test water temperature
8. Wear shoes/socks
9. Shop for good shoes
10. Call doctor
11. Check inside shoes
12. Apply lotion
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