Fall 11-2015

Diabetes Self-Management Education for Adults With Type 2 Diabetes Mellitus

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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2015

Abstract

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Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

November 2015

Abstract

Diabetes, a major public health challenge in St. Kitts, has been a focus of international public health community research. Although researchers have demonstrated that diabetes self-management education is a cost-effective strategy for the prevention of diabetes-related complications, they have yet to establish whether there is adequate education occurring in treatment settings with diabetic patients. The purpose of the study was to implement and evaluate the short-term effectiveness of a diabetes self-management education intervention on diabetes-related knowledge and accepted behavioral changes to decrease risk for complications. Based on a self-care approach, this education intervention was designed to improve diabetes-related knowledge and self-management behaviors. To test and evaluate the pre and post intervention effect, a convenience sample of 15 patients diagnosed with Type 2 diabetes attending a scheduled diabetic clinic completed the Diabetes Knowledge Test and a researcher-designed sociodemographic survey, which included self-report of blood glucose self-monitoring and foot care behaviors. The results of these analyses indicated that the participants' knowledge level increased ($p = < .001$). However, Chi-square and Fisher's exact tests determined no significant changes in the participants' self-management behaviors. The results may be attributed to the short time frame of the intervention. The implications for positive social change include opportunities to improve inter-professional collaboration in programs that will create positive effects on diabetic self-care and reduce the incidence of negative health outcomes. Furthermore, the use of a self-care approach by health care professionals could be a key factor in strengthening diabetes knowledge, engagement, and self-management for Type 2 diabetic patients.

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Dedication

This project is dedicated to almighty God in whom all things are possible through faith. I am truly thankful for the encouragement and support of my husband, Levi, who has been with me on this journey to complete this project. Thank you and I appreciate everything that you do and continue to do to ensure my success. To my two sons, Kyle and Brandon, thank you both for your patience and support during this journey as well. I appreciate and love you both very much. To my sister, Sheila, thank you for always listening to my concerns and offering a different perspective that addressed the problems I experienced in completing the project. To my parents, Augustine and Blanch Dennis, who have always instilled in me to be whatever I wanted to be and never give up even when the going gets tough. Thank you.

Acknowledgments

I would like to take this opportunity to express my sincere gratitude to my Committee Chair, Dr. Wilson, and Committee Member, Dr. Murielle Beene, I am truly grateful for their mentoring, expert guidance, and patience that has allowed me to successfully complete this project.

I would also like to recognize the support and guidance of my practicum preceptor and the other nurses who all provided a supportive environment to complete my objectives for my DNP practicum experience. A hearty thank you to my family and friends for their support during this journey to complete the project.

Last, but most of all, thank you to my husband, Levi Bradshaw, who is a source of strength and unwavering support, patience, guidance, and love during my long nights toiling on my project. Thank you for being the wind under my wings.

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Section 1: Nature of the Project

Introduction

The World Health Organization (WHO) estimated that the prevalence of diabetes among adults in 2014 was 9% and predicts that there will be at least 350 million people with Type 2 diabetes by 2030 with more than 80% of cases living in developing countries (WHO, 2015). Similarly, reports for Latin American and the Caribbean project a 148% increase in diabetes cases, resulting in 33 million persons diagnosed with diabetes by 2030 (WHO, 2015). In the Caribbean, the prevalence of diabetes is higher among females, 9.3%, compared to 6.4% among males (Ferguson, Tulloch-Reid, &Wilks, 2010). Consequently, diabetes is a major public health challenge in St. Kitts and Nevis, as it is the fourth leading cause of death after heart disease, stroke, and cancer. Diabetes has a prevalence rate of 13.2% with 4,600 individuals on register (International Diabetes Federation [IDF], 2014).

Diabetes is associated with a substantial risk of morbidity and mortality because of cardiovascular, renal, and neurologic complications and is also linked to end-stage renal failure, blindness, and limb amputation (Schiotz et al., 2012). The increased prevalence of diabetes related complications require the implementation of an innovative strategy to promote patient self-management. In this project, I aim to implement an educational and supportive intervention for patients with Type 2 diabetes and to evaluate the effectiveness of the intervention on diabetes knowledge and self-management behavior of patients attending a community health center.

Researchers have indicated that self-management education, a continuous process of facilitating knowledge, skills, and ability, is a required component for successful diabetes care (Funnell et al., 2013). Self-management places the patient at the center of the care by empowering them to make daily decisions about their disease that leads to improved outcomes (Baghbanian & Tol, 2012; IDF, 2014; Siminerio, Zgibor, & Solano, 2004).

Problem Statement

The problem that was addressed in this Doctor of Nursing Practice (DNP) project is a lack in the content of diabetes education provided to patients of a community health center in order to manage their disease. Self-management is a significant process for the prevention of costly diabetes related complications. There is an urgent need and a great opportunity for the implementation and evaluation of an innovative strategy to promote patient self-management education. Diabetes self-management education should include medication adherence, self-monitoring of blood glucose levels, proper education on nutrition, care of the foot, and importance of physical activity (Elliottt, Abdulhadi, Al-Maniri, Al-Shafaee, & Wahlstrom, 2013; Hampson et al., 2001). Diabetes self-management education can control and prevent relevant complications and improve quality of life (American Association of Diabetes Association [AADE], 2003; Shen, Edwards, Courtney, McDowell, & Wu, 2012).

The aim of this project was to implement a diabetes education intervention and to determine its effectiveness on diabetes knowledge and behavioral changes such as blood glucose self-monitoring and foot care.

Purpose Statement

The purpose of this project was to implement and determine the short-term effectiveness of a diabetes self-management education intervention on diabetes-related knowledge and behavioral changes. The behavioral changes included blood glucose self-monitoring and foot care among patients with Type 2 diabetes. If diabetes is left unattended, it can lead to neuropathy and results in lower limb amputation, kidney failure, blindness, and death (Centers for Disease Control and Prevention [CDC], 2007). Diabetes self-management education can only be effective if diabetic patients are provided adequate knowledge and are motivated enough to self-manage their disease to prevent complications.

Project Objectives

1. Identify an increase in patient diabetes-related knowledge levels related to healthy eating, physical activity, prevention and management of hypo-/hyperglycemia, prevention of complications, proper foot care, and medication adherence.
2. Identify an increase in patients' blood glucose self-management behavior, and
3. Identify an increase in patients' foot care behavior.

Significance/Relevance to Practice

Diabetes is a complex chronic disease that requires active patient participation to self-manage their condition on a daily basis, which necessitates education (Kemper, Savage, Niedebaumer, & Anthony, 2005). Diabetes self-management education can lead to empowerment of diabetic patients (Aghili et al., 2013). It has been identified as "the

gold standard" for diabetes management and has proven to be an integral component in the care of diabetes as well as being economically effective in the prevention of diabetes related complications (Hill & Clark, 2008; Kemper et al., 2005). The goals of self-management education are to improve metabolic control, prevent acute and chronic complications, enhance quality of life, and maintain cost effectiveness (Funnell et al., 2013). People with diabetes face an uphill battle and goal achievement is not always easy; however, it is the responsibility of the patients to accept and adapt to lifestyle behaviors.

Consequently, there is a need to provide adequate diabetes education and to thoroughly evaluate these educational initiatives for potential behavioral change. This is possible when individuals are provided with the appropriate education and support to successfully manage and control their disease (Holt, 2014). According to Mensing et al. (2002) "such evaluations inform patients of their progress, report back to providers on effectiveness of specific interventions, of the wide effectiveness of a program, and inform all the stakeholders involved of the cost effectiveness of such programs" (p. 41). Consistent evaluation is important to drive patient education and patient clinical decision making in a much more cost-effective manner (Mensing et al., 2002). The strategy to conduct annual assessments of self-management skills and diabetes knowledge as well as make provisions for continuing diabetes education is included as recommendations of the American Diabetes Association (Norris, Lau, Smith, Schmid, & Engelgau, 2002). Healthy People 2020 also included in the diabetes-related objectives to "increase to 60%, from the 1998 baseline level of 40%, the proportion of individuals with diabetes who

receive formal diabetes education" (Norris et al., 2002, p. 1159). It is clearly evident that diabetes educators must be vigilant about the advancements in knowledge, treatment strategies, educational strategies, and the increasing changes in the health care environment. This process is necessary to inform policy decision makers of the significance of diabetes self-management education and the impact it has on prevention and delay of diabetes related complications (Funnell et al., 2013). Therefore, diabetes self-management education can only be effective if diabetic patients are provided adequate knowledge and are motivated enough to self-manage their disease to prevent complications. Diabetes self-management education should include medication adherence, self-monitoring of blood glucose levels, proper education on nutrition, care of the foot, and importance of physical activity (Elliottt et al., 2013; Hampson et al., 2001).

Project Questions

There were three project questions. After a self-management education session,

1. Is there an improvement in diabetic patients' knowledge pre and post the diabetes education program?
2. Is there an increase in diabetic patients' blood glucose self-monitoring behaviors pre and post the diabetes education program?
3. Is there an increase in diabetic patients' foot care behavior pre and post the diabetes education program?

Evidence-Based Significance of the Project

The prevalence of persons with diabetes in St. Kitts and Nevis has increased, which has placed significant economic burden on the health care system (Pan American

Health Organization [PAHO], 2012). The main goal of diabetes education is to "support the efforts of people with diabetes to understand the nature of their illness and its treatment; to identify emergency health problems at early, reversible stages; to adhere to self-care practices; and to make necessary changes to their health habits" (Narayan et al., 2006, p. 152). An Atlas Report of the IDF (2011) revealed that the global prevalence of diabetes has escalated in developing countries of the world, with an expectation that more than 552 million people will be living with diabetes by 2030. These reports on increased prevalence of diabetes in the developed and developing countries present substantial challenges for the prevention of diabetes related complications. Additionally, studies have been done on the use of nonpharmacological interventions, including diabetes education, to prevent the complications of diabetes in developing countries. The literature from the United States, for instance, has revealed that self-management education is a cost-effective intervention, which can reduce the costs of diabetes care and management in developing countries (Aghili et al., 2013). Similar studies were done to determine the cost effectiveness of diabetes self-management education, and findings indicated that in Latin American countries, this strategy was successful in decreasing cost diabetes medications by 62%, and another study in Argentina revealed a decreased cost of 38% for diabetes care (Narayan et al., 2006). Thus, diabetes education programs have been proven to be very cost effective and should be considered a high priority as an intervention that will decrease the prevalence of diabetes related complications (Aghili et al., 2013).

Siminerio, Ruppert, Emerson, Solano, and Piatt (2008) conducted a study with the

aim to explore opportunities to meet the Healthy People 2010 goal, which was to "increase to 60%, from the 1998 baseline level of 40%, the proportion of individuals with diabetes who receive diabetes education" (p. 1159). It was concluded that diabetes self-management education at the primary level was feasible and creates an environment to include patients who were not receiving diabetes education (Siminerio et al., 2008). Therefore, it is imperative that individuals with diabetes must take responsibility and engage in self-management activities for their disease; hence, diabetes education is an important element in the care of the diabetic patient (Narayan et al., 2006).

Implications for Social Change in Practice

This project would assist in filling the gap of health disparities in the self-management of Type 2 diabetes and to empower and engage patients in their own self-management. I recognize the significance of diabetes self-management education and its implications for positive social change for patients, families, and communities in terms of cost effectiveness and improved quality care outcomes. In this project, I will identify the gaps in knowledge and self-management among Type 2 diabetics and will contribute significant information that will inform policy decision-makers in the development of health care policy that will guide the evaluation of diabetes self-management education. Social change will be realized through the increase in the proportion of diabetic patients who receive diabetes self-management education and are able to improve self-management of their disease.

Definition of Terms

The following definitions were used to guide this project.

Blood glucose self-monitoring: A process of engaging in self-monitoring blood glucose preprandial and postprandial after each main meal (Holt, 2014).

Diabetes self-management education: An interactive, collaborative, ongoing process involving the person with diabetes and the educator(s). This process includes (a) assessment of the individual's specific education needs, (b) identification of the individual's specific diabetes self-management goals, (c) education and behavioral intervention directed toward helping the individual achieve identified self-management goals, and (d) evaluation of the individual's attainment of identified self-management goals (Mensing et al., 2002).

Effectiveness: Improvement in the posttest diabetes self-management education score of the diabetic patients after the administration of diabetes education program compared to the pretest knowledge and self-management score (Mensing et al., 2002).

Foot care: Daily inspection of the feet includes to check for changes in color, breaks in the skin, swelling, numbness, or pain, and dryness and cracks in the skin (Learning about Diabetes, Inc., 2006).

Self-management: Patient adherence to a "self treatment regimen" inclusive of diet, maintaining physical activity, daily monitoring of blood glucose levels, and adhering to medication therapy and foot care, all of which are vital to maintaining glycemic control (Sousa, Hartman, Miller, & Carroll, 2008).

Type 2 diabetes: A disease in which the body is unable to produce sufficient amounts of or respond to insulin, a hormone required by the body to convert glucose to energy (Mensing et al., 2002).

Assumptions and Limitation

Assumptions

Assumptions are "statements taken for granted or considered true, even though they have not been scientifically tested" (Burns & Grove, 2009, p. 688). The assumptions for this project included the following:

1. It is assumed that knowledge leads to behavior change.
2. It is assumed that all participants have some prior knowledge of diabetes.
3. Diabetes self-management education assists Type 2 diabetic patients to acquire the necessary knowledge to prevent diabetes related complications.
4. Diabetes self-management education increases patient diabetes-related knowledge levels related to healthy eating, physical activity, prevention and management of hypo-/hyperglycemia, prevention of complications, proper foot care, and medication adherence.

Limitation

Limitations are "theoretical and methodological restrictions or weaknesses in a study that may decreased the generalizability of the findings" (Burns & Grove, 2009, p. 707).

1. This project intervention cannot be generalized to other community health settings.

Summary

Diabetes self-management education is a nonpharmacological intervention that provides patients with adequate knowledge and skills to increase the self-management of

their diabetes. Diabetes self-management education contributes to positive social change for patients, families and communities in terms of empowerment, cost effectiveness, and quality care outcomes. Diabetes is a complex chronic disease that requires active patient participation to self-manage their condition on a daily basis and it requires education (Kemper et al., 2005). Therefore, it is vital to assist individuals diagnosed with Type 2 diabetes to prevent and delay life-threatening complications.

Section 2: Review of Literature and Theoretical and Conceptual Framework

Introduction

The purpose of the literature review is to evaluate the evidence and to gain knowledge about the topic for the proposed project (White & Dudley-Brown, 2012). The evidence of the effectiveness of diabetes education on patients' knowledge and behavioral changes is lacking locally. Diabetes self-management education has been endorsed by various established organizations including the American Diabetes Association and IDF and has been identified as the "gold standard" in diabetes self-management, which provides patients with the knowledge and skills necessary to manage their diabetes. All these organizations recognize that education is a fundamental aspect of diabetes care. The literature was explored to justify the need to evaluate the effectiveness of an educational intervention on Type 2 diabetic patients' knowledge and behavioral changes. The theoretical framework that guided the project is also included in this section.

The literature search was done electronically from the following databases: EBSCOHOST, MEDLINE, and Walden Library databases for online journals using the search terms *diabetes, diabetes education programs*, and *Type 2 diabetic patients*. Established health organizations and nonhealth organization websites were also used for information: CDC, AADE, PAHO, WHO, and the World Bank.

Key terms that were used to locate information included *diabetes education*, *Type 2 diabetes*, *self-management*, and *self-management education*.

Diabetes

A former director of the PAHO described noncommunicable diseases in Latin America and the Caribbean as a "tsunami" (Gittens-Gilkes, Hartman, Derouin, Warrican, & Duncan, 2013). In particular, the Caribbean has been estimated to have the largest increase in the prevalence of Type 2 diabetes in the next 20 years (Hunt, 2013; Hunt, Eldemire-Shearer, & Tulloch-Reid, 2013). The standard of living in the Caribbean has improved considerably over the past years, causing an increase in migration from rural to urban areas and an increased consumption of high fat, sugar, and diet low in fiber.

Diabetes is defined as

> a metabolic disorder of multiple etiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both. The effects of diabetes mellitus include long–term damage, dysfunction and failure of various organs. (WHO, 1999)

Notably, there are two main types of diabetes: Type 1(T1B), which is usually developed during childhood and adolescence and requires a lifelong treatment of insulin to survive and Type 2 diabetes (T2B); this type is mainly seen in adulthood and is closely associated with obesity, physical inactivity, and unhealthy diets and usually occurs in people above age 30. This is the most common type and accounts for 90% to 95% of diabetic cases worldwide. Treatment may include lifestyle modifications and weight loss alone or treatment with oral medications or insulin injections (WHO, 1999). Type 2 diabetes is also "characterized by (a) insulin resistance, which prevents the uptake of glucose by

skeletal muscle, (b) a decrease in pancreatic beta cell function which alters the release of insulin, and (c) an increase in gluconeogenesis by the liver" (Gumbs, 2012, p. 19). Persons with diabetes suffer the burden of this debilitating condition compounded with limited treatment options and there is no cure. The diagnosis of diabetes is made when the fasting plasma glucose value is ≥126 mg/dl, and/or if the causal plasma glucose value is ≥200 mg/dl, or if the plasma glucose is ≥200 mg/dl following 75 g oral glucose load (WHO, 1999).

Complications

Diabetes related complications have contributed to the spiraling cost of health care for patients with Type 2 diabetes and for the public health system. Diabetes complications are classified as acute and chronic. The acute complications represent temporary changes in blood glucose levels, whereas the chronic complications are long duration of hyperglycemia. Acute complications include hypoglycemia, hyperglycemia, infection, and insulin allergy. The chronic complications include neuropathy and vascular diseases and are the leading causes of premature deaths among patients with Type 2 diabetes. The chronic complications are of two types; macrovascular complications which include atherosclerosis and cardiovascular disease, myocardial infarction and stroke and the microvascular complications which include retinopathy, neuropathy, and nephropathy (Hunt, 2013). Diabetes self-management education has been recognized as an important component that can help in the reduction of the high prevalence of complications in people with Type 2 diabetes (Karakurt & Kasikci, 2012).

Prevalence of Diabetes

The IDF estimated that about 366 million persons with diabetes would escalate to 552 million by 2030, and the largest increase would be seen among the working population (as cited in Narayan et al., 2006). Some of the reasons for the increased prevalence of diabetes in the Caribbean included increased economic development and improved health status leading to increased longevity (Wilkes et al., 1999).

The population of St. Kitts and Nevis is 50,134, and the total population of individuals with diabetes age 20 to 79 is 4,600, with the prevalence of 13.3% (IDF, 2014). The rapid economic development in St. Kitts and Nevis during the last 20 years has been accompanied by increased prevalence of diabetes (PAHO, 2012). Further, a report from The World Bank (2012) revealed that St. Kitts and Nevis had the highest change in urbanization in 2010 of 1.8% within the Eastern Caribbean States and that rate was expected to increase in 2015. Interestingly, the prevalence of diabetes mellitus is higher in women than men and impacted the working population more. This same trend has been reported in all Eastern Caribbean States (WHO, 2008). The prevalence rate of diabetes mellitus in St. Kitts and Nevis may seem extremely small when compared to other countries, but the increase in diabetes must not be taken lightly or ignored.

Morbidity

Diabetes mellitus is associated with substantial morbidity and mortality risks because of cardiovascular, renal, and neurologic complications and is also linked to end-stage renal failure, blindness, and lower-extremity amputation that result in disability and a reduction of life of 10 years (Schiotz et al., 2012). This has produced a negative impact

on health and socioeconomic structures in the Caribbean (PAHO, 2012). According to the CDC (2011), a report of new cases in 2008 revealed that diabetes was a cause of blindness for individuals aged 20 to 74 years old. Diabetes is treatable, and Type 2 diabetes is preventable, but when left untreated, there is a risk for life threatening complications resulting in a silent death (CDC, 2011). There were 90 lower extremity amputations recorded in St. Kitts between the periods of 2010 to 2011, with 65 being male (PAHO, 2012).

Mortality

High death rates from diabetes were found in countries mainly with a large population of diabetes, which includes the USA, China, and India (International Diabetes Atlas, 2012). Moreover, high mortality rates for diabetes have been reported in South and Central America, West Pacific, North America and the Caribbean, and Middle East and North Africa Regions (International Diabetes Atlas, 2012). While most countries showed a decline in their mortality rates for other chronic diseases, there was no reported decline for diabetes (IDF 2011). Diabetes was identified as one of the leading health threats to individuals in the Caribbean, and reports have presented evidence of the increased growth and economic burden placed on the Caribbean region from chronic diseases, especially diabetes mellitus (Cunningham-Myrie, Reid, & Forrester, 2008). The mortality rates have dominated most of the attention during the past 3 decades (Cunningham-Myrie, Reid, & Forrester, 2008) with cardiovascular diseases accounting for the highest death rates due to diabetes (The World Bank, 2012).

Notably, the prevalence of persons with diabetes in St. Kitts and Nevis has increased, and so has the mortality rate, which now stands at 3.16%. A report from the PAHO (2012) revealed that diabetes was the fourth leading cause of death in St. Kitts and Nevis after heart disease, stroke, and cancer. The PAHO (2009) (as cited in Gittens-Gilkes et al., 2013) reported that diabetes-related mortality rates in St. Kitts and Nevis were 77.2 deaths per 100,000. Meanwhile, there has been an increase in the prevalence of diabetes related lower extremity amputations and other life-threatening complications (PAHO, 2012).

Cost Burden of Diabetes in St. Kitts and Nevis

Diabetes has imposed substantial economic burden on the national health system. In 2010 worldwide cost of diabetes care accounted for 11.6% of health care cost. During the same period, prevention and treatment of diabetes and its related complications totaled USD376 billion and was expected to exceed USD490 billion by 2030. Globally, diabetes costs in 2010 was on average USD703 per person and for North America and the Caribbean the cost was USD 214 billion or 57% of the global cost. Diabetes mellitus has become one of the most burdensome public health challenges for the Caribbean in the twenty first century (Ferguson, Tulloch-Reid, & Wilks, 2010).

Statistics in St. Kitts and Nevis revealed that diabetes has made a considerable impact on the healthcare sector as a result of the spiraling cost of diabetes management and its related complications. The increased hospitalizations have placed a substantial socioeconomic burden on the nation's expenditure, individuals and their families, which accounted for US$1,120 or EC$3,024 per person (US$1.0 = EC$ 2. 70) (IDF, 2014). In

2013, the cost of care for diabetes was USD1.5 million. This is especially noted in the treatment for foot infections that accounted for 13% of the expenditure. There were 90 lower extremity amputations recorded in St. Kitts and Nevis in 2010 to 2011 (PAHO, 2012). Self-management of diabetes is the "basis of diabetes care" (Jalilian, Motlagh, Solhi, & Gharibnavaz, 2014, p. 1). The cost of diabetes care can be drastically reduced by creating awareness of risk factors and symptoms through education on diet, exercise, blood sugar monitoring, and medication adherence. This is a strategy that has been endorsed by the American Association of Diabetes (Jalilian et al., 2014).

Self-Management

Self-management of diabetes places the patient at the center of the care and empowers them to make daily decisions about their disease to improve health outcomes (Baghbanian & Tol, 2012). Self-management also requires the patient to adopt lifestyle changes, balance their resources, values and preferences with a preventive regimen complete with eating healthy, regular physical activity, self-monitoring of blood glucose and medication adherence. Self-management of Type 2 diabetes is linked to self-care concept, which includes activities that individuals initiate and engage in voluntarily to maintain life, health and wellbeing. Poorly controlled diabetes is closely linked with poor self-management that has increased diabetes related complications and treatment cost (Venkatesh, Weatherspoon, Kaplowitz, & Song, 2013).

Individuals affected with diabetes are often without adequate knowledge about the nature of their disease, its risks factors and associated complications and that this limitation of awareness maybe an underlying factor affecting their self-management

(Abdo & Mohamed, 2010).

Xu, Pan, and Liu (2010) concluded in their study that individuals with less education were less likely to engage in diabetes self-management. Additionally, the study revealed that individuals with longer period of diabetes and insulin treatment were more actively engaged in blood glucose self-monitoring than those with a shorter period and using oral hypoglycemia medication.

However, effective self-management interventions can improve clinical outcomes. Self-management skills are both complex and comprehensive and demand that patients with Type 2 diabetes possess the ability to integrate a variety of daily activities to successfully perform self-management (Xu, Pan, and Liu (2010).

Self-Management Education

The literature revealed that self-management education was "the gold standard" for diabetes management and has been proven to be an integral component in the care of diabetes (Funnel et al., 2013). Patients with low literacy have poor knowledge. Poor diabetes knowledge is common among individuals with low literacy, which results in difficulties learning advanced self-management skills needed to improve glycemic control. Literacy was found to be an important factor for predicting those individuals who would benefit from an intervention for self-management of diabetes (Kisokanth, Prathapan, Indrakumar, & Joseph, 2013). Additionally, studies also indicated that diabetes self-management education should be provided at the patients' education level so that it meets their level of understanding (Elliott, Abdulhadi, Al-Maniri, Al-Shafaee, & Wahlstrom, 2013).

Gill, Kumar, and Wiskin (2008) reported that individuals 65 years and less were more knowledgeable than their older counterparts. It was concluded that this was due to the older adults experience with more diabetes related complications leading to confusion about the signs and symptoms of diabetes.

Successful self-management is often a challenge for older individuals especially in the presence of mild cognitive impairment and a longer duration of diabetes. Individuals with good memory are able to maintain vigilance in foot checking and blood glucose monitoring (Tomlin & Asimakopoulou, 2014). Studies that reported the use of self-management education in developed countries have deduced the positive impact this intervention has on the prevention of complications (Ezenwaka & Eckel, 2011). Diabetes self-management education can only be effective if Type 2 diabetic patients are provided adequate knowledge and are motivated enough to self-manage their disease to prevent complications. This signifies that patient education is essential (Ezenwaka & Eckel, 2011).

Numerous studies have explored the issue of diabetes self-management education and several variables have been examined. Efforts have been made to continuously equip persons with diabetes with the necessary knowledge to self-manage their disease. Self-management education played a positive role in increasing self-management among Type 2 diabetic patients as was demonstrated in the finding of Jalilian, Motlagh, and Solhi (2012) when they used lecture and group discussion for a group of Type 2 diabetic patients.

Ergenmann and Colagiuri (2007) suggested that self-management behaviors of patients with Type 2 diabetes should be evaluated at baseline and at regular intervals following the intervention. They also opined that outcomes such as learning, behavioral, clinical and health status were also important to assess as a way to demonstrate the interrelationship between diabetes self-management education and behavior change. Additionally, the individual outcomes of each patient should be used as a guide for the intervention that will improve the care for the patients.

Another study on the effectiveness of diabetes education program for Type 2 diabetes revealed that the majority of patients had low levels of knowledge (67%) in different areas of diabetes. It also revealed significant low levels of knowledge among females (31%), not educated and older age groups but following education intervention there was significant improvement in patients' knowledge (78% and 72%) (Abdo & Mohamed, 2010). It was concluded that diabetes education was an effective intervention that improved patients' knowledge about diabetes (Abdo & Mohamed, 2010).

Perara, DeSilva, and Perera (2013) assessed the knowledge of diabetes among Type 2 diabetic patients at a primary health care clinic and revealed the significance of educational programs to fill the knowledge gaps of patients in the area of symptoms of poor control and regular follow-ups. In this study, 150 patients (135 females, 15 males) were interviewed about diabetes knowledge. The findings revealed 70% of patients had a good score (>65) on knowledge test. It was also revealed that patients with longer duration of diabetes had better mean scores for knowledge.

Elliott et al. (2013) studied diabetic patients in a primary care setting. Diabetes self-management and education could be assessed by patients' recognition and responses to hypo-and hyperglycemia and strategies they developed to maintain blood glucose levels. This study included patients' demographic information, self-management behaviors, awareness of potential long-term complications, and attitudes of diabetes management. It was revealed that the majority of the patients had dangerous diabetes self-management and knowledge gaps.

The main goal of diabetes education is to improve the knowledge and skills of diabetic patients by helping them to modify lifestyles and gain confidence to improve their knowledge and skills. Structured diabetes educational programs can prove beneficial to diabetic patients when presented either on a one-to-one basis or with groups of individuals. This strategy was identified in a study conducted by Dhanalakshmi and Subashini (2013) when they assessed the effectiveness of structured teaching program on knowledge regarding selected aspects of diabetes mellitus such as, diet, exercise, medication, foot care, and prevention of complications.

Norris, Engelgau, and Narayan (2001) conducted a systematic review of randomized controlled trials and identified 72 studies from 84 articles and found that self-management training on knowledge of diabetes had positive results in less than 6 months. However, most study results were limited in generalizability. Similarly, a meta-analysis also revealed that diabetes knowledge among patients with Type 2 diabetes showed improvement with diabetes self-management education (CDC, 2014).

It is also important not to just evaluate the accuracy of the effectiveness of education by the patients' acquired knowledge on a one-time basis. There should be a re-evaluation process since the strength of the education can either deteriorate or the knowledge is decreased over time. Therefore, the educational activity must involve follow up by health care providers after program completion and then conducted periodically. Reinforcement of the diabetes education is guaranteed for long-term glucose control as the patients' adhere to the knowledge and behavioral change pattern (Kosti & Kanakari, 2012).

According to Hawthorne, Robles, Cannings-John, and Edwards (2010) diabetes self-management education must be considerate of the cultural aspect of the target population in regards to the language needs and literacy skills of the patients. To accomplish this objective I will incorporate the use of colored visual aids.

Numerous studies have successfully used the Diabetes Knowledge Test (DKT) questionnaire, which was developed by the Michigan Diabetes Research and Training Center (MDRTC) at the University of Michigan (MDRTC), 1998) to evaluate study participants' knowledge on diabetes. The questionnaire has been used successfully in studies to determine the effectiveness of diabetes self-management education on self-management activities. The DKT instrument has been tested for reliability and validity (Cronbach's alpha of $\geq$ 0.71 overall) (McCleary-Jones, 2011).

Diabetes Self-Management Education Materials

This project incorporated the use of diabetes educational materials that are freely available online from Learning About Diabetes, Inc. (2006) which was developed by

Chwast, Pau, and Frempong (2006). The goal of this organization is to provide easy to understand diabetes care information to people with diabetes, the general public and diabetes health care professionals (Learning About Diabetes, Inc., 2006). Information included in these education materials are closely aligned with the American Association of Diabetes Educators [AADE] seven self-care behaviors such as, healthy eating, being active, monitoring, taking medication, problem solving, reducing risks and healthy coping (AADE, 2014). The information in these education materials have also been endorsed by the CDC, National Diabetes Education Program, National Diabetes Information Clearing House and the Joslin Diabetes Center as an invaluable resource for teaching diabetic individuals about their condition (Learning About Diabetes, Inc., 2006). The topics that have been identified for use in the project are; what is diabetes, exercise, healthy eating, understanding blood sugar and foot care.

Cost Effectiveness of Diabetes Self-Management Education

Cost effectiveness in health care has become a primary concern and a way to measure both health and economic outcomes for services provided. The education of individuals with Type 2 diabetes has been proven to improve their quality of life. Norris, Engelgau, and Narayan (2001) reported findings from 72 published studies on the effectiveness of diabetes self-management education that has demonstrated support for the effectiveness of diabetes self-management education for patients with Type 2 diabetes. In another study Boren, Fitzner, Panhalkar, and Specker (2009) concluded upon completion the results demonstrated diabetic self-management education for patients who

participated in a diabetes education program experienced lower health cost than those who did not.

Blood Glucose Self-Monitoring

In the management of Type 2 diabetes self-monitoring of blood glucose is advocated as one of the most accurate and valuable measurement (O'Kane & Pickup, 2009) and has been widely accepted as a valuable tool to help individuals with diabetes understand the impact of foods, medication and activities on blood glucose levels (Gurkova, Cap, & Siakova, 2009). Blood glucose self-monitoring is done preprandial or first thing in the morning prior to the first meal and then postprandial or two hours after each main meal (Holt, 2014). (Norris, Engelgau, and Narayan, 2001) reported an increased incidence and accuracy of blood glucose self-monitoring among Type 2 diabetic patients who attended self-management education programs.

Patients with Type 2 diabetes have experienced endless problems in diabetes self-management, since regular testing is often difficult to sustain in the long term. Study results demonstrated that among Type 2 diabetic patients using insulin only 35.7% of patients with Type 2 diabetes performed blood glucose monitoring (Holt, 2014). Atak, Gurkan, and Kose (2014) reported that between 40% and 80% of individuals only half reported their blood glucose levels to their care providers. Additionally, Hewitt, Smeeth, Chaturvedi, Bulpitt and Fletcher (2010) reported in their study that it was the younger participants who tested their blood glucose at home. The study also revealed that more participants tested approximately once per day (64.4%) and (35. 6%) measured weekly or less frequently. Patients must be able to effectively self-manage their disease by

acquiring the necessary knowledge, skills and confidence to make behavioral changes such as, testing blood sugar management (Hewitt, Smeeth, Chaturvedi, Bulpitt, & Fletcher, 2010).

Significance of Foot Care

Diabetic patients account for 70% of all patients experiencing lower extremity amputations. The risks of lifetime diabetic foot ulcer could be as high as 25% and studies also revealed that 15% to17% of theses ulcers result in surgical intervention (Abu-Oamar, 2014). Males especially had more amputations at a younger age than women and also suffered more comorbidities (Bruun, Siersma, Guassora, Hostein, & Oivarius, 2013). The CDC also reported that diabetes accounted for 65,700 or 65% of non-traumatic, lower limb amputations (CDC, 2011). According to Abu-Qamar (2014) diabetes self-management education was a key strategy in the prevention of foot ulceration, which was one of the most common causes for hospitalization for patients with Type 2 diabetes. Patients with lower limb amputations are faced with numerous challenges and experts have acknowledged that with appropriate self-management education on preventative activities the risk of amputations can be reduced up to half. Numerous studies have demonstrated that regular inspections and proper foot wear were very important in foot ulcer prevention (Abu-Qamar, 2014).

Conceptual Model

According to Polit and Beck (2010), conceptual models serve as a springboard for the advancement in knowledge.

Orem's Self-Care Model

Dorothea Orem's self-care model was used to guide the project to determine whether a diabetes self-management education program will increase diabetes-related knowledge related to healthy eating, physical activity, prevention and management of hypo-/hyperglycemia, prevention of complications, proper foot care, and medication and changes in behavior such as, self-monitoring of blood glucose and foot care.

Orem's model focuses the individual's ability to perform self-care, which is defined as "a human regulatory function that individuals must, with deliberation, perform themselves or have performed for them to maintain life, health, development, and wellbeing" (Evans, 2010, p. 318). Inclusive in Orem's model are three theories: theory of nursing systems, theory of self-care deficit and theory of self-care (Evans, 2010).

This project was based on self-management of Type 2 diabetes and through education patients must adhere to treatment guidelines (Evans, 2010). Self-care is learnt; therefore patients must use their self-care abilities to respond to a known need since self-care activities play a vital role in diabetes management (Harvey & Lawson, 2008). The patient as the self-care agency must be responsible to apply the knowledge of diabetes in order to maintain blood glucose levels to near normal levels and to engage in other health practices, such as, foot care to prevent complications (McEwen & Wills, 2011).

George (2010) described self-care demand as "the measures of care required in order to meet existent requisites which demand regulatory action to maintain life, promote health and development of general well-being" (p. 130).

In order for nurses to engage patients in activities to meet their self-care demands, nurses must use available resources to meet the self-care requisites and the therapeutic needs of the patients. This project aims to implement a diabetes self-management education intervention for the patients with Type 2 diabetes to support and develop self-care abilities. Orem's model goes on to explain that supportive educative systems "can perform or can learn to perform the therapeutic self-care but cannot do so without assistance" (George, 2010, p. 132). Areas included for the education intervention are definition of diabetes, healthy eating, foot care, physical exercise, understanding blood sugar and prevention of complications.

Summary

The literature focused on the effectiveness of diabetes self-management education on patients' knowledge and behavioral changes. It has been noted that Type 2 diabetes is a debilitating and costly chronic disease that has presented substantial challenges for individuals, families and the public health system. There is overwhelming evidence that demonstrated the cost effectiveness of diabetes self-management education in the prevention of complications and improved outcomes. In reviewing the literature it was noted that with diabetes self-management the patient must be central to the care, which empowers and also improves health outcomes. However, there remains a gap in the literature related to the translation of the evaluation of diabetes self-management education in the community setting by a Doctor of Nursing Practice (DNP) nurse. The literature provided some solutions such as evaluation of diabetes education to determine the effectiveness on patients' knowledge and behavioral changes. The use of Orem's

self-care deficit theory assisted in determining the significance of self-care for Type 2 diabetic patients. It is therefore, essential that diabetes self-management education be consistently evaluated to determine the effectiveness on patients' knowledge and behavioral changes.

Section 3: Methodology

Project Design/Methods

To complete this project, a pre- and post-tests education intervention was done with a convenience sample of Type 2 diabetic participants during a scheduled monthly diabetic clinic at a community health center. Follow up and posttest were conducted 2 weeks after the intervention. The results of the project evaluation were shared with the stakeholders.

I completed the implementation of the project, which was a one-time education intervention that used a single-group guided by a teaching outline (see Appendix G). Printed diabetes educational materials inclusive of colored pictures were used to concretize the concepts for the participants during the education intervention. The topic areas that were covered for the education session included what is diabetes, understanding blood sugar, diabetes and healthy eating, exercise and diabetes, and diabetes and your feet. The education intervention lasted 45 minutes to 1 hour, and participants were given the opportunity to ask questions. A follow up posttest was self-administered using the identical pretest questionnaires 2 weeks after the education intervention. All questionnaires were collected prior to the implementation of the education intervention and I kept them in a secured location under lock and key.

The diabetes education program was done during a monthly scheduled diabetes clinic visit and was prearranged with the community health nurses to avoid disruption in the normal workflow. A request for a private room was made for the accommodation of a

group of participants to ensure privacy and quietness for the implementation of the education session.

I approached individual participants after they had registered for the diabetic clinic and invited them to volunteer their participation in the project. The project objectives were explained to the participants. Participants gave implied consent to participate in the project and received a copy of the informed consent (see Appendix B). The participants completed two questionnaires: the sociodemographic questionnaire for data on age, gender, marital status, education level, duration of diabetes, family history of diabetes, blood glucose self-monitoring before and after meals, and foot care practices. The participants then completed a self-administered DKT pretest questionnaire survey (see Appendix D). The MDRTC at the University of Michigan (MDRTC, 1998) developed the DKT to test diabetes knowledge. The DKT is a self-administered 23-item multiple-choice questionnaire that measures diabetes knowledge applicable to Type 2 diabetes. Questions relate to knowledge of diet, hypoglycemia, management, activity, effect of illness and infection on blood sugar levels, foot care, and signs and symptoms of diabetes neuropathy. Each item has three or four possible answers with only one correct answer. The questionnaire has a readability level of sixth grade and can be administered in 15 minutes. Each participant was given a quiet area to complete the questionnaires anonymously; this enabled confidentiality (Terry, 2012).

Permission was granted to use the DKT instrument, Grant Number P30DK092926 (MCDTR) from the National Institute of Diabetes and Digestive and Kidney Diseases for

the project (see Appendix H). Permission was also granted from the Learning About Diabetes, Inc. (2009) for use of the diabetes education materials (see Appendix I).

The approach for this project was to conduct a translation and evaluation of a diabetes self-management education intervention. Approval from Walden's University Institutional Review Board (IRB, study #06-24-15-0367489) and a Letter of Cooperation from the Ministry of Health, St. Kitts (see Appendix A) formed part of the process for the project in order to guarantee human subjects protection. The participants were informed that by their completion of the questionnaires, they indicated their implied consent to participate in the project. I developed, implemented, and evaluated the project at a community health center in St. Kitts.

Population and Sampling

The population for the project was patients diagnosed with Type 2 diabetes. A convenience sample was used to recruit the participants for the project. Inclusion for the project was participants registered in the diabetic register who attended a monthly scheduled diabetic clinic at a community health center. Exclusion was those participants who were unable to read or write and those who did not give consent for inclusion in the project.

Participants were recruited based on their willingness to participate in the project. Participants were informed that by their completion of the questionnaires, they implied their informed consent to participate in the project. Participants were assured of confidentiality of the data collected for the period during the project. Each participant received a copy of the informed consent.

Data Collection

Data collection tools are "procedures or instruments used to guide the collection of data in a standardized fashion" (Polit & Beck, 2010, p. 716). The literature provides the evidence that an evaluation of the effectiveness of diabetes self-management education programs is crucial to assessing knowledge, satisfaction, empowerment, and self-efficacy (Peyrot & Rubin, 1994).

Data collection for this project was done using pre- and post education intervention to determine the effectiveness of a diabetes self-management education on diabetes knowledge and behavioral changes such as blood glucose self-monitoring and foot care. The participants completed two questionnaires: a sociodemographic questionnaire (see Appendix C), which I developed, and the DKT questionnaire (see Appendix D) developed by the MDRTC at the University of Michigan (MDRTC, 1998). No names or contact information were collected for individual participants during the completion of the questionnaires.

The self-administered sociodemographic questionnaire was developed using the literature for content area and information and consisted of two sections: Section A consisted of sociodemographic data with four items including age, gender, marital status, and education; Section B consisted of clinical information with five items including duration of diabetes, type of diabetes treatment, blood glucose self-monitoring, foot care, and family history of diabetes. The questionnaire was evaluated and critiqued by an expert panel comprised of a senior nurse administrator in community health nursing, a physician in community health services, and a statistician from an academic institution.

The DKT is a self-administered 23-item multiple-choice questionnaire that measures diabetes knowledge applicable to Type 2 diabetes. Questions relate to knowledge of diet, hypoglycemia, management, activity, effect of illness and infection on blood sugar levels, foot care, and signs and symptoms of diabetes neuropathy. Each item has three or four possible answers with only one correct answer. The questionnaire has a readability level of sixth grade and can be administered in 15 minutes. The DKT instrument has been tested for reliability and validity (Cronbach's alpha of $\geq$ 0.71 overall) (McCleary-Jones, 2011).

Prior to their participation, participants were informed of the purpose of the project. The participants were also informed of their right to withdraw from the project at anytime and that this would not affect the normal care received at the health center.

Two weeks after the educational session only those participants who completed the pretest and education were re-administered the identical sociodemographic questionnaire for self-report of blood glucose self-management and foot care and completion of the DKT questionnaire. The participants completed all questionnaires; there were no incomplete questionnaires. I completed the intervention for the project over a period of 2 weeks. Only 11 (73%) of the participants who completed the pretest and education session returned for the follow up and posttest.

Patients who did not participate in the pre- and post-tests for this project were invited and participated in the educational session. This process was in keeping with the Belmont Report Guidelines to provide these patients with the information that is

considered beneficial to their health and welfare (U. S. Department of Health & Human Services, 2015).

Content Validity

Content validity refers to the degree to which an instrument measures what it is supposed to measure (Polit & Beck, 2010). I developed a self-administered sociodemographic questionnaire (see Appendix C), which included a diabetes related information section on Type 2 diabetes. The questionnaire was developed using the literature that provided the content area and information. To ensure content validity, the questionnaire, objectives of the project, operational definitions and criteria checklist were submitted to a panel of three experts, one from community health nursing, a physician in community health services and one statistician from an academic institution with expertise in statistics (see Appendix E). The questionnaire consists of two sections; Section A: consists of socio-demographic data with four items including age, gender, marital status and education. Section B: consists of clinical information with five items including, duration of diabetes, and type of diabetic treatment, blood glucose self-monitoring, foot care, and family history of diabetes.

I developed the criteria for validation of the instrument. The scale comprised of four items for the sociodemographic data and five items that addressed clinical information. The criteria for the rating scale consisted of three categories; “Strongly Agree,” “Agree,” “Disagree,” and “Remarks” (see Appendix F). The panel was asked to make comments on individual items in relation to the accuracy, clarity, and style of the translated items. There was 100% agreement for all items.

Protection of Human Subjects

Participants were informed that all information given by them would remain confidential and anonymous and locked in a safe and I having the only access. There was no identification provided on questionnaires to link the responses to individual participants. Participants were also given the assurance that their participation was voluntary and that they can withdraw at any time during the period of the project and that their participation or non participation would have no effect on the normal care that they receive. Participants did not receive any incentives to participate in the project. All participants received a copy of the informed consent after an explanation of the procedures for the project and upon agreement to participate in the project; each participant gave their implied consent. Approval for the project from the Walden's University Institutional Review Board (IRB, study #06-24-15-0367489) and a Letter of Cooperation from the Ministry of Health, St. Kitts (see Appendix A) formed part of the process for the project in order to guarantee human subjects protection.

Data Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS), version 21. Descriptive statistics were used to report participants' characteristics. The independent *t* test was used to evaluate the mean knowledge scores. Frequencies and percentages were used to report blood glucose self-monitoring and frequencies were used to report foot care behaviors. Chi-square evaluated the proportion of participants' behavioral changes for blood glucose self-monitoring before and after the educational

intervention. The Fisher's exact test evaluated the proportion of participants' behavioral changes for foot care before and after the educational intervention.

Project Evaluation Plan

The process of developing the evaluation plan was initiated during the planning phase of the project. The planned evaluation process was discussed with the interdisciplinary team in regards to the data that will be collected for the desired outcome. The purpose of this project was to implement and determine the short-term effectiveness of a diabetes self-management education intervention on diabetes-related knowledge and behavioral changes. The behavioral changes included blood glucose self-monitoring and foot care among patients with Type 2 diabetes. The diabetes education program was preceded by a pretest then follow up and posttest after 2 weeks. The participants were verbally reminded to return to the health center after 2 weeks for follow up and posttest. The evaluation is a significant process of the project that will assist health care providers in designing appropriate education programs for Type 2 diabetic patients who lack knowledge and who are not involved in appropriate self-management behaviors such as blood glucose self-monitoring and foot care.

The short-term evaluation was based on the participants' response to the pre- and post-tests diabetes knowledge questions using the DKT survey and self-report of blood glucose self-monitoring and foot care. The results of the evaluation will form the baseline for continuous quality assessments. The MDRTC at the University of Michigan (MDRTC, 1998) developed the DKT questionnaire. The DKT is a self-administered 23-item multiple-choice questionnaire that measures diabetes knowledge and self-

management applicable to either Type 1 or Type 2 diabetes. Questions relate to knowledge of diet, hypoglycemia, management, activity, effect of illness and infection on blood sugar levels, foot care, signs and symptoms of diabetes neuropathy. Each item has three or four possible answers with only one correct answer. The questionnaire has a readability level of sixth grade and can be administered in 15 minutes. The DKT has been used successfully in other studies (McCleary-Jones, 2011). Data were analyzed using the Statistical Package for Social Sciences (SPSS), version 21. Descriptive statistics were used to report participants' characteristics. The independent *t* test was used to evaluate the mean knowledge scores. Frequencies and percentages were used to report blood glucose self-monitoring and frequencies were used to report foot care behaviors. Chi-square was used evaluated the proportion of participants' behavioral changes for blood glucose self-monitoring before and after the educational intervention. The Fisher's exact test evaluated the proportion of participants' behavioral changes for foot care before and after the educational intervention.

The project results were shared with the interdisciplinary team at the community health center. The long-term evaluation will be based on data from the continuous assessment including follow up of diabetes self-management education activities using the DKT questionnaire, questions related to blood glucose self-monitoring and foot care at intervals of 3, 6, and 12 months. Results will be reviewed and analyzed to determine the long-term effect on participants' diabetes knowledge and behavioral changes. Reports will be shared with the stakeholders.

Summary

Reducing diabetes related complications is a long-term goal of Type 2 diabetes management and is acquired through the implementation of a diabetes self-management education program. Diabetes self-management education is an evidence-based strategy that will result in long-term quality improvement for patients with Type 2 diabetes, their families and the society. This section of the project focused on the development of the quality improvement project, the implementation plan, data collection methods and analysis that will determine the effectiveness of the education intervention in terms of evaluation.

Section 4: Findings, Discussion, and Implications

Findings

In this project, I identified a registered attendance of a convenience sample of 15 Type 2 diabetic participants at a community health center. Twenty potentially eligible patients attended the scheduled diabetic clinic. Fifteen of the patients (75%) agreed to participate in the project. The other five patients who refused participation in the project indicated that they were not interested.

Descriptive statistics were used to report participants' characteristics. The mean age of the participants was 59.3 years (*SD* 5.1). Based on a descriptive analysis on the sociodemographic data, it was revealed that of the 15 participants, five (33.3%) were males and 10 were (66.7%) females. The majority of the participants were single, seven (46.7%), four (26.7%) were married, and four (26.7%) were a widow/widower; six (40%) had primary education, six (40%) had a secondary education, two (13.3%) had college education, and one (6.7%) had a university education. Over half of the participants (53.3%) had been diagnosed with Type 2 diabetes for more than 10 years, 26.7% less than 5 years, and 20% between 5 and10 years. More than half of the participants (53.3%) used insulin, and 46.7% used pills. The great majority of the participants (73.3%) had a family history of diabetes. Table 1 summarizes the demographic characteristics of the study sample.

Table 1

Demographic Characteristics of Study Sample (N=15)

Characteristic	*N* =15	%
Age		
41-50	1	6.7
51-60	5	33.3
61-65	9	60.0
Gender		
Male	5	33.3
Female	10	66.7
Marital Status		
Married	4	26.7
Single	7	46.7
Widow/Widower	4	26.7
Education		
Primary	6	40.0
Secondary	6	40.0
College	2	13.3
University	1	6.7
Diagnosed with Type 2 Diabetes		
Less than 5 years	4	26.7
5-10 years	3	20.0
More than 10 years	8	53.3

(table continues)

Characteristic	*N* =15	%
Type of Diabetic Treatment		
Insulin	8	53.3
Pills	7	46.7
Family History of Diabetes		
Yes	11	73.3
No	4	26.7

Only participants who completed the pre- and post-tests and the education program were included in this project. The project questions were as follows:

1. Is there an improvement in diabetic patients' knowledge pre and post the diabetes education program?
2. Is there an increase in diabetic patients' blood glucose self-monitoring behaviors pre and post the diabetes education program?
3. Is there an increase in diabetic patients' foot care behavior pre and post the diabetes education program?

The first project question was analyzed using the independent *t* test to evaluate the mean knowledge scores. Table 2 shows the mean knowledge score obtained from the participants pretest was 12.66 (*SD* = 3.2) compared to mean score of 19.00 (*SD* = 2.8) post educational intervention; the standard deviation had decreased from 3.2 to 2.8. An independent samples *t* test was conducted to compare knowledge scores pre- and post-

educational intervention. There was a significant difference in the pretest knowledge score (M = 12.66, SD 3.2) and posttest knowledge score (M = 19.00, SD 2.8); t (23) = -5.070, p = < .001. This would suggest that there was an increase in the knowledge level given that the premean test was less than the mean posttest. This result suggested improvement in diabetic patient knowledge as a result of the education intervention.

Table 2

Knowledge Scores at Pre- and Post-Educational Intervention

	N	Mean	Std. Deviation	Std. Error Mean
Pretest	15	12.6667	3.19970	.82616
Posttest	11	19.0000	2.82843	.89443

The second question asked if there was an increase in diabetic patients' blood glucose self-monitoring behaviors after the diabetes educational program. Frequencies and percentages were used to report on this behavior, and the Chi-square was used to evaluate the proportion of participants' behavior change. The participants were requested to report about their blood glucose self-monitoring behavior. Table 3 shows that, before education, about 66.7% reported monitoring their blood glucose before breakfast. After education about 54.5% out of 11 participants reported monitoring their blood glucose before breakfast. This indicates education did not significantly affect the proportion of participants who test blood glucose before breakfast (p = .197). In addition, participants reported on monitoring their blood glucose after meals. Before education, four

participants monitored blood glucose after meals. After education, the proportion of participants who monitored their blood glucose after meals increased. However, there was no significant difference between the proportion of the participants who monitored their blood glucose after meals and those who did not monitor their blood glucose (p = .071).

Table 3

Frequency Distribution of Blood Glucose Self-Monitoring Behavior Pre- and Post-Educational Intervention

Variable	Pretest (N = 15)	Posttest (N=11)	Chi-Square value	*df*	*Asymp. Sig.
Before	10 (66.7)	6 (54.5)	1.667	1	.197
After	4 (26.6)	5 (45.5)	.071	1	3.267

Note. * p >0.05

The final question in the project asked if there is an increase in diabetic patients' foot care behavior pre and post the diabetes educational program. Frequencies were used to report on this behavior, and a Fisher's exact test evaluated the proportion of participants' behavior change. The importance of daily foot care was highlighted in the educational program because it constitutes one of the preventative methods of lower extremity amputations. Table 4 shows that prior to the education program, 11 of the participants reported they checked their feet daily, three of the participants reported checking their feet weekly, and only one reported never checking his feet. After the

education, eight out of 11 participants reported checking their feet daily, while two reported checking their feet weekly, and one participant reported never checking his feet. The results indicate that the education intervention did not produce any significant changes ($p = 0.43$) in behavior for daily, weekly and never foot care.

Table 4

Frequency Distribution of Foot Care Behavior Pre- and Post-Educational Intervention

Variable	Pretest ($N = 15$)	Posttest ($N = 11$)
Daily	11	8
Weekly	3	2
Never	1	1

Note. * $p > 0.05$

Discussion

Orem's self-care model was used to guide the project to determine whether a diabetes self-management education program will increase diabetes-related knowledge related to healthy eating, physical activity, prevention and management of hypo-/hyperglycemia, prevention of complications, proper foot care, and medication and changes in behavior such as self-monitoring of blood glucose and foot care.

The main goal of diabetes education is to improve the knowledge and skills of diabetic patients by helping them to modify lifestyles and gain confidence to improve their knowledge and self-management skills. Structured diabetes educational programs

can prove beneficial to diabetic patients when presented either on a one-to-one basis or with groups of individuals (Dhanalakshmi & Subashini (2013).

The purpose of this DNP project was to evaluate the effectiveness of diabetes self-management education program on diabetes-related knowledge and behavioral changes such as; blood glucose self-monitoring and foot care among patients with Type 2 Diabetes. The intervention was a one-time education session that used a single-group of participants attending a monthly scheduled diabetic clinic. This project used a pre- and post-tests education program intervention to collect data on participants' knowledge level using the DKT questionnaire and sociodemographics and behavior changes such as, blood glucose self-monitoring and foot care. Only participants who completed the pre- and post-tests including the education program were included in this project.

The literature provides the evidence that diabetes self-management education is an effective intervention that improves diabetes knowledge. During the education session printed diabetes educational materials inclusive of colored pictures were used to make the concepts more concrete for the participants. In this project the increase in knowledge level was notable (Table 2). There was significant improvement ($p < .001$), which was similar to other studies (Abdo & Mohamed, 2010; Atak, Gurkan, & Kose, 2008; Dhanalakshmi & Subashini, 2013; Norris, Engelgau, & Narayan, 2010; Perara, DeSilva, & Perara, 2013). This project included participants (53%) with a longer duration (more than 10 years) of diabetes, which may have contributed to better knowledge scores as revealed in a study conducted by Perara, DeSiva, and Perara (2013).

Blood glucose self-monitoring is recognized as the most accurate and valuable

measurement, which when used to correct abnormal blood glucose levels, can significantly decrease the risks of long-term complications and medical costs, related to Type 2 diabetes (Norris, Engelgau, & Narayan, 2001; O'Kane & Pickup, 2009; Venkatesh, Weatherspoon, Kaplowitz, & Song, 2013). Researchers have identified the positive effect that attendance at self-management education programs has on the frequency and accuracy of blood glucose self-monitoring. However, the findings in this project revealed that although participants' knowledge level increased this knowledge did not translate into the ability to change participants' behaviors in regard to blood glucose self-monitoring (Table 3). This finding is similar to the findings of Abu-Qamar (2014) who identified that while patients were aware of the complications of Type 2 diabetes, very few were motivated to participate in lifestyle changes. Similarly, other researchers have identified that after education less than half of the patients with Type 2 diabetes performed blood glucose self-monitoring (Hewitt, Smeeth, Chaturveti, Bulpitt, & Fletcher, 2010; Holt, 2014). According to Jalilian, Motlagh, Solhi and Gharibnavaz (2014), self-management participation is vital to success in the treatment of diabetes, which demands "motivation, knowledge and compliance to a difficult and complex lifetime regimen" (p. 2)

Foot care was another topic that was highlighted during the educational session. Following education, the participants' foot care behavior was not significantly changed (Table 4). This finding is contradictory to most studies that revealed education increased the frequency of daily foot care as a key strategy in the prevention of foot ulcers that might lead to lower extremity amputations for patients with Type 2 diabetes (Abu-

Qamar, 2014).

The findings in this project in regard to self-management behaviors are similar to the findings of Elliott et al. (2013) that revealed the majority of the patients attending diabetic clinics in the primary care setting had dangerous diabetes self-management gaps.

This DNP project has fulfilled some of the Essentials developed by the (American Association of Colleges of Nurses [AACN], 2006). Essential VIII: Advance Nursing Practice (AACN, 2006) was demonstrated by the implementation and evaluation of the translation of a diabetes self-management education program intervention into practice to improve knowledge and encourage behavioral changes. Translation of the evidence into practice enables the integration of the best evidence identified in the literature with clinical decision-making and patient care outcomes. The findings of this project underscore the importance of patients with Type 2 diabetes receiving ongoing self-management support that focus on the benefits of behavioral changes.

Implications

Practice

The knowledge outcome in this project clearly identified the positive impact that education has on patients with Type 2 diabetes. It is believed that those participants who participated in the project will return to their community and use their acquired knowledge to recognize the adverse consequences of noncompliance to self-management activities. Programs can be developed that emphasize self-management support to sustain behaviors at a level that will promote successful diabetes management. Nurses are in a unique position to incorporate various strategies such as follow up care and educational

and behavioral goal setting to sustain the ongoing behaviors that will assist diabetic patients to manage their disease. This project also fosters interprofessional collaboration in the management and control of Type 2 diabetes (Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes) (AACN, 2006).

Research

This project has identified gaps in self-management behaviors such as blood glucose self-monitoring and foot care. This project has also provided valuable baseline data for a future project to include reinforcement of education, behavioral goal setting and evaluation at intervals of 3, 6, and 12 months to determine changes in self-management behaviors.

Social Change

This project finding indicated that the education program intervention significantly ($p < .001$) increased diabetes knowledge although this knowledge did not translate into behavioral changes related to blood glucose self-monitoring and foot care. This finding suggests that diabetes education programs could be a key factor in strengthening diabetes knowledge and provides the opportunity to impact societal change by translating this project into policy development and implementation (Essential V: Health Care Policy for Advocacy in Health Care) (AACN, 2006). A policy may standardize diabetes education to enable audit and evaluation of its effectiveness in improving diabetes self-management.

Project Strengths, Limitations, and Recommendations

Strengths

The use of diabetes self-management education as a 'gold standard' strategy has been proven to be cost effective and is successful in decreasing the cost of diabetes care and related complications (Aghili et al., 2013; Narayan et al., 2006). A conceptual model was used to guide this project based on the effectiveness of diabetes self-management education on knowledge and behavioral changes for patients with Type 2 diabetes.

Limitations

There were several limitations in this project including a time frame of 2 weeks, which did not allow enough time for the detection of change in behaviors for blood glucose self-monitoring and foot care. Perhaps a future project with a longer time frame would realize a change in self-management behaviors. The sample size is also small with 15 participants attending a monthly scheduled diabetic clinic at a community health center. This project also used a convenience sample, which does not allow for generalizability of the project's results to the total population of Type 2 diabetic patients and this sampling method also carries the risk of bias. Participants self report are subjected to recall bias that may have affected the participants' responses (Terry, 2012).

Recommendations

Future projects would benefit from a larger sample size and a longer follow up period that would strengthen the project results. This project was conducted over a 2-week period; a longer time frame would be necessary to evaluate the impact of the education program in regard to behavior changes. The outcomes could be used to guide

interventions that would improve the health outcome for the specific diabetic patients undergoing the educational intervention.

Analysis of Self

Scholar

The DNP program has prepared me with the necessary requisites to make a difference through my continuous involvement in the translation of evidence into clinical practice that makes a difference in health care. Dissemination is an important process of translation of evidence and it is significant for us as advanced practitioners to ensure our project findings are shared in publications or conference presentations in order to affect change at all levels of the health care system. Sharing my project findings with other nurses in various health care settings allows me to contribute significantly to new knowledge on diabetes education in clinical practice (Terry, 2012).

Practitioner

As a DNP graduate I can use my leadership skills to influence and collaborate with the health care organization to enhance, restructure, and improve the quality of health care for Type 2 diabetic patients. This is important as an advanced nurse practitioner because it is expected that we provide care that is "safe, effective, patient centered, timely, efficient, and equitable" (Zaccagnini & White, 2011, p. 214). The finding of this project indicated that there is an opportunity to evaluate care delivery approaches that meet current and future needs of this specific population (Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking) (AACN, 2006).

Project Developer

The development of this DNP Project was a learning experience that provided the opportunity to make a unique contribution to the health care system in St. Kitts and Nevis. A needs assessment provided the impetus to search the literature to determine the most cost effective evidence-based intervention to bridge the gap within the diabetes management system in St. Kitts. Under the experienced guidance of my preceptor and program instructors, I was able to plan, implement, and disseminate my DNP Project. In keeping with the DNP Essentials (AACN, 2006), it was important to explore a cost-effective strategy that has been shown to impact societal change as it relates to management of patients with Type 2 diabetes.

My experiences in NURS 8410, NURS 8400, and NURS 8500 and the development of this project have allowed me to reflect on my own strengths and challenges both as an advanced nurse practitioner and as a DNP student. I believe that my overall experience both in the practicum and the development of this project has enhanced my professional growth, especially my leadership and communication skills and teamwork. I plan to continue to build upon these skills as a scholar practitioner and make a difference in health care for vulnerable populations. This process is aligned with the AACN Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking (AACN, 2006).

Future Professional Development

As a nurse leader I have grown professionally because of my interaction with frontline nurses and being able to share in their experiences with the dilemmas they face

with diabetes management. I envisage that my engagement in the policy process for a change in the delivery of diabetes self-management education would contribute to quality health outcomes for Type 2 diabetic patients. This process is closely aligned with the AACN Essential V: health Care Policy for Advocacy in Health Care (AACN, 2006).

Summary and Conclusions

This project evaluated the effectiveness of diabetes self-management education for adults with Type 2 diabetes mellitus in a community health center. The literature revealed that self-management education was "the gold standard" for diabetes management and has been shown to be an integral component in the care of diabetes. The finding of this project indicated an increase in the participants' knowledge level however; this knowledge did not translate into behavioral changes in regard to blood glucose self-monitoring and foot care. The implications for positive social change include interprofessional collaboration efforts to provide programs that will create positive effects on diabetic care to reduce the incidence of negative health outcomes. Furthermore, the use of a self-care approach by health care professionals could be a key factor in strengthening diabetes knowledge and self-management for Type 2 diabetic patients.

Section 5: Scholarly Product

Conference Proceedings

Project Title

Diabetes Self-Management Education for Adults with Type 2 Diabetes Mellitus

Background

The World Health Organization (WHO) estimated that the prevalence of diabetes among adults in 2014 was 9% and predicts that there will be at least 350 million people with Type 2 diabetes by 2030 with more than 80% of cases living in developing countries (WHO, 2015). Similarly, reports for Latin American and the Caribbean project a 148% increase in diabetes cases, resulting in 33 million persons diagnosed with diabetes by 2030 (WHO, 2015). In the Caribbean, the prevalence of diabetes is higher among females, 9.3%, compared to 6.4% among males (Ferguson, Tulloch-Reid, &Wilks, 2010). Consequently, diabetes is a major public health challenge in St. Kitts and Nevis, as it is the fourth leading cause of death after heart disease, stroke, and cancer. Diabetes has a prevalence rate of 13.2% with 4,600 individuals on register (International Diabetes Federation [IDF], 2014).

Diabetes is associated with a substantial risk of morbidity and mortality because of cardiovascular, renal, and neurologic complications and is also linked to end-stage renal failure, blindness, and limb amputation (Schiotz et al., 2012). The increased prevalence of diabetes related complications require the implementation of an innovative strategy to promote patient self-management. In this project, I aim to implement an educational and

supportive intervention for patients with Type 2 diabetes and to evaluate the effectiveness of the intervention on diabetes knowledge and self-management behavior of patients attending a community health center.

Purpose

In this project, I aimed to implement an educational and supportive intervention for patients with Type 2 diabetes and to evaluate the effectiveness of the intervention on diabetes knowledge and self-management behavior of patients attending a community health center.

Nature of the Project

Studies have indicated that diabetes self-management education; a continuous process of facilitating knowledge, skills, and ability is a required component for successful diabetes care (Funnell et al., 2013). Self-management places the patient at the center of the care by empowering them to make daily decisions about their disease that leads to improved outcomes (Baghbanian & Tol, 2012). The American Diabetes Association reviewed diabetes self-management education standards and findings revealed that individuals who had not received formal education were at risk for increased diabetic complications. A meta-analysis of self-management education for adults with Type 2 diabetes complications revealed an improvement in glycemic control at immediate follow up (Shrivastava, Shrivastava, & Ramasamy, 2013).

Dorothea Orem's self-care model provided the conceptual framework for the project to determine whether a diabetes self-management education program will increase

diabetes-related knowledge and changes in behavior such as self-monitoring of blood glucose and foot care.

Research Design

This project used a pre- and post-tests educational intervention at a monthly scheduled diabetic clinic with a convenience sample of 15 participants diagnosed with Type 2 diabetes. Participants were assured of confidentiality and gave their implied consent for their participation.

Setting

The setting for this DNP Project was a community health center in St. Kitts.

Data Collection

Approval from Walden's University Institutional Review Board (IRB, study #06-24-15-0367489) formed part of the process for the project in order to guarantee human subjects protection. The participants were informed that by their completion of the questionnaires, this indicated their implied consent to participate in the project. Each participant was given a copy of the informed consent.

The participants completed two questionnaires: a sociodemographic questionnaire which I developed and the DKT questionnaire developed by the MDRTC at the University of Michigan (MDRTC, 1998). Eleven (73.3%) participants returned after 2 weeks for follow up and posttest. They completed the identical sociodemographic questionnaire to collect data related to glucose self-monitoring and foot care and also completed the DKT questionnaire. All questionnaires were completed anonymously and participants were assured of confidentiality.

Presentation of Results

Only participants who completed the pre- and post-tests including the education program were included in this project.

There were three project questions. After a self-management education session,

1. Is there an improvement in diabetic patients' knowledge pre and post the diabetes education program?
2. Is there an increase in diabetic patients' blood glucose self-monitoring behaviors pre and post the diabetes education program?
3. Is there an increase in diabetic patients' foot care behavior pre and post the diabetes education program?

The first project question was analyzed using the independent *t* test to evaluate the mean knowledge scores. Table 1 shows the mean knowledge score obtained from the participants pretest was 12.66 (*SD* = 3.2) compared to mean score of 19.00 (*SD* = 2.8) post educational intervention; the standard deviation had decreased from 3.2 to 2.8. An independent samples *t* test was conducted to compare knowledge scores pre- and post-educational intervention. There was a significant difference in the pretest knowledge score (*M* = 12.66, *SD* 3.2) and posttest knowledge score (*M* = 19.00, *SD* 2.8); *t* (23) = -5.070, *p* = < .001. This would suggest that there was an increase in the knowledge level given that the premean test was less than the mean posttest. This result suggested improvement in diabetic patient knowledge as a result of the education intervention.

Table 1

Knowledge Scores at Pre- and Post-Educational Intervention

	N	Mean	Std. Deviation	Std. Error Mean
Pretest	15	12.6667	3.19970	.82616
Posttest	11	19.0000	2.82843	.89443

The second question asked if there was an increase in diabetic patients' blood glucose self-monitoring behaviors after the diabetes educational program. Frequencies and percentages were used to report on this behavior, and the Chi-square was used to evaluate the proportion of participants' behavior change. The participants were requested to report about their blood glucose self-monitoring behavior. Table 2 shows that, before education, about 66.7% reported monitoring their blood glucose before breakfast. After education about 54.5% out of 11 participants reported monitoring their blood glucose before breakfast. This indicates education did not significantly affect the proportion of participants who test blood glucose before breakfast ($p = .197$). In addition, participants reported on monitoring their blood glucose after meals. Before education, four participants monitored blood glucose after meals. After education, the proportion of participants who monitored their blood glucose after meals increased. However, there was no significant difference between the proportion of the participants who monitored their blood glucose after meals and those who did not monitor their blood glucose ($p = .071$).

Table 2

Frequency Distribution of Blood Glucose Self-Monitoring Behavior Pre- and Post-Educational Intervention

Variable	Pretest (*n*=15)	Posttest (*n*=11)	Chi-Square value	df	*Asymp. Sig.
Before	10 (66.7)	6 (54.5)	1.667	1	.197
After	4 (26.6)	5 (45.5)	.071	1	3.267

Note. * $p > 0.05$

The final question in the project asked if there is an increase in diabetic patients' foot care behavior pre and post the diabetes educational program. Frequencies were used to report on this behavior and a Fisher's exact test evaluated the proportion of participants' behavior change. The importance of daily foot care was highlighted in the educational program because it constitutes one of the preventative methods of lower extremity amputations. Table 3 shows, that prior to the education program 11 of the participants reported they checked his feet daily, three of the participants reported checking their feet weekly and only one reported never checking his feet. After the education, eight out of 11 participants reported checking their feet daily, while two reported checking their feet weekly, and one participant reported never checking his feet. The results indicate that the education intervention did not produce any significant changes ($p = 0.43$) in behavior for daily, weekly and never foot care.

Table 3

Frequency Distribution of Foot Care Behavior Pre- and Post-Educational Intervention

Variable	Pretest (*N*=15)	Posttest (*N*=11)
Daily	11	8
Weekly	3	2
Never	1	1

Noted. * $p > 0.05$

Interpretation of Findings, and Implications for Evidence-Based Practice

The main goal of diabetes education is to improve the knowledge and skills of diabetic patients by helping them to modify lifestyles and gain confidence to improve their knowledge and self-management skills. Structured diabetes educational programs can prove beneficial to diabetic patients when presented either on a one to one basis or with groups of individuals (Dhanalakshmi & Subashini, 2013).

In this project the increase in knowledge level was notable (Table 1). There was significant improvement ($p < .001$), which was similar to other studies (Abdo & Mohamed, 2010; Atak, Gurkan, & Kose, 2008; Dhanalakshmi & Subashini, 2013; Norris, Engelgau, & Narayan, 2010; Perara, DeSilva, & Perara, 2013). Additionally, this project had 53% of participants with a longer duration of diabetes, which may have contributed to better knowledge scores as revealed in a study conducted by Perara, DeSiva, and Perara (2013).

Blood glucose self-monitoring has been recognized as the most accurate and valuable measurement, which can significantly decrease the risks of long-term

complications and medical costs, related to Type 2 diabetes (Norris, Engelgau, & Narayan, 2001; O'Kane & Pickup, 2009; Venkatesh, Weatherspoon, Kaplowitz, & Song, 2013). Researchers have identified the positive effect that attendance of self-management education programs has on the frequency and accuracy of blood glucose self-monitoring. However, the finding in this project showed that although participants' knowledge level increased this did not translate into the ability to change participants' behavior in regards to blood glucose self-monitoring (Table 2). This result is similar to the findings of (Abu-Qamar, 2015) who identified that while patients were aware of the complications of Type 2 diabetes, very few were motivated to make the necessary lifestyle changes. Other researchers have also identified that after education less than half of the patients with Type 2 diabetes performed blood glucose self-monitoring (Hewitt, Smeeth, Chaturveti, Bulpitt, & Fletcher, 2010; Holt, 2014).

Regular foot care was another topic that was highlighted in the education program. This is a key strategy in the prevention of foot ulcers that might lead to lower extremity amputations for patients with Type 2 diabetes (Abu-Qamar, 2014). Following education the results of the participants' foot care behavior was not significant (Table 3) which is contradictory to most studies that indicated education increased the frequency of daily foot inspection (Abu-Qamar, 2014).

Implications

Practice

The knowledge outcome in this project clearly identified the positive impact that education has on patients with Type 2 diabetes. It is believed that those participants who

participated in the project will return to their community and use their acquired knowledge to recognize the adverse consequences of noncompliance to self-management activities. Programs can be developed that emphasize self-management support to sustain behaviors at a level that will promote successful diabetes management. Nurses are in a unique position to incorporate various strategies such as follow up care and educational and behavioral goal setting to sustain the ongoing behaviors that will assist diabetic patients to manage their disease. This project also fosters interprofessional collaboration in the management and control of Type 2 diabetes (Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes) (AACN, 2006).

Research

This project has identified gaps in self-management behaviors such as blood glucose self-monitoring and foot care. This project has also provided valuable baseline data for a future project to include reinforcement of education, behavioral goal setting and evaluation at intervals of 3, 6, and 12 months to determine changes in self-management behaviors.

Social Change

This project finding indicated that the education program intervention significantly ($p <$ .001) increased diabetes knowledge although this knowledge did not translate into behavioral changes related to blood glucose self-monitoring and foot care. This finding suggests that diabetes education programs could be a key factor in strengthening diabetes knowledge and provides the opportunity to impact societal change by translating this project into policy development and implementation (Essential V: Health Care Policy for

Advocacy in Health Care) (AACN, 2006). A policy might standardize diabetes education to enable audit and evaluation of its effectiveness in improving diabetes self-management.

Summary and Conclusions

This project evaluated the effectiveness of diabetes self-management education for adults with Type 2 diabetes mellitus in a selected community health center. The literature revealed that self-management education was "the gold standard" for diabetes management and has been shown to be an integral component in the care of diabetes. The findings of this project indicated an increase in the participants' knowledge level; however, this knowledge did not translate into the ability to change participants' behavior in regard to blood glucose self-monitoring and foot care. Therefore, strategies are needed including interprofessional collaborative efforts between diabetes educators, policy developers and advanced nurse practitioners to provide programs that will create positive effects on diabetic care to reduce the incidence of negative health outcomes.

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Appendix A: Letter of Cooperation

SAINT CHRISTOPHER AND NEVIS

MINISTRY OF HEALTH AND ENVIRONMENT
COMMUNITY-BASED HEALTH SERVICES
P.O. Box 236
BASSETERRE
ST KITTS WEST INDIES

5th June 2015

Dear Mrs. Dennis-Bradshaw,

The Department of Community-Based Health Services is pleased to work with you in your capacity as a Doctor of Nursing Practice (DNP) student, who will be conducting a translation and evaluation of a diabetes education session at a selected Community Health Center in St. Kitts entitled, **'Effectiveness of Diabetes Self-Management Education for Adults with Type 2 Diabetes Mellitus in a selected Community Health Center'.** We agree to supervise and assume responsibility for these activities within the scope of our regular operations during June – August 2015.

We understand that you will also be undertaking a Walden University student researcher role that is separate from your Nurse Educator/Lecturer role. In your student researcher role, you are hereby permitted to recruit a convenience sample of Type 2 diabetic patients during a monthly scheduled diabetic clinic, using self-administered pre- and post test data collection questionnaires and to disseminate results of the project by way of a report to the Department of Community-Based Health Services.

We understand that you will allow participants to volunteer their participation through implied consent and that they can withdraw at any time during the implementation of the project. Furthermore, their participation or non-participation would have no effect on the normal care that they receive, in order to minimize conflicts of interest and other potential ethical problems. Also, no patient identification will be collected and disclosed at any time during the study.

As the student you will be responsible for complying with our research approval process which involves the submission of an application and the study proposal to the Ministry of Health with receipt of approval prior to the initiation of the study.

We understand that our organization's responsibilities include: supervision of the implementation of the project by personnel at the practicum site as well as the Department of Community Health Services, the provision of a private room, use of the diabetic register to identify eligible participants, and supervision of educational sessions and to take responsibilities for recruiting patients for the educational sessions. Patients who did not provide pre and posttest

data would be given the option to participate in the educational session. We reserve the right to withdraw from the study at any time if our circumstances change.

We understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the student's supervising faculty/staff without permission from the Walden University IRB.

Sincerely,

Retna Walwyn Browne MD MPH
Director of Community-Based Health Services (Ag.)

Appendix B: Informed Consent

CONSENT FORM

You are invited to take part in a research study of the effectiveness of diabetes self-management education on your knowledge of diabetes and changes in blood glucose self-monitoring and foot care. The researcher is inviting patients diagnosed with Type 2 diabetes, age 21-65, with the ability to read and write and who are registered at the diabetic clinic to be in the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by a researcher named Rondalyn Dennis-Bradshaw, who is a Doctor of Nursing Practice (DNP) student at Walden University.

Background Information:

The purpose of this study is to determine the effectiveness of a diabetes self-management education program on diabetes-related knowledge and behavioral changes, such as blood glucose self-monitoring and foot care among patients with Type 2 diabetes.

Procedures:

If you agree to be in this study, you will be asked to:

- To complete on your own a pretest questionnaire relating to age, gender, marital status, education level, duration of diabetes, family history of diabetes, blood glucose self-monitoring before and after meals, and foot care practices which will take about 3-4 minutes to complete. You will also be asked to complete on your own Diabetes Knowledge Test survey that will take 15 minutes to complete. No identifying information will be collected and confidentiality will be maintained.

Here are some sample questions:

- Age?
- Education level?
- Since how long do you have diabetes?
  Less than 5 years
  5 – 10 years
  More than 10 years
- Which is the best method for testing blood glucose?
  Urine testing
  Blood testing

Both are equally good

Voluntary Nature of the Study:

This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. No one at the community health center will treat you differently if you decide not to be in study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

Risks and Benefits of Being in the Study:

Being in this type of study involves some risks of the minor discomforts that can be encountered in daily life, such as fatigue. Being in this study would not pose risk to your safety or wellbeing.
The benefits of the study to the individual include empowerment to increase self-management and positive lifestyle changes to prevent diabetes related complications.

Payment:

Participants will not receive any form of payment for their voluntary participation in the study.

Privacy:

Any information you provide will be kept anonymous. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure in sealed privacy envelopes and upon completion will be returned in the same sealed privacy envelopes. The sealed privacy envelopes will be kept solely in the possession of the DNP student. Data will be protected by passwords and jump drives as back up copies. Jump drives will be locked in metal file cabinet in my home. I will have the only access to hard copy and electronic file. Data will be kept for a period of at least 5 years, as required by the university.

Contact and Questions:

You may ask any questions you have now. Or if you have questions later, you may contact the researcher via 869-662-9269. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 001-612-312-1210. Walden University's approval number for this is **06-24-15-0367489** and it expires on **June 23, 2016.**

Please keep this consent form for your records.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By returning a completed survey I understand that I am agreeing to the terms described above.

Appendix C: Sociodemographic Questionnaire

Self-Administered Assessment On Diabetes Self-Management Education For Patients With Type 2 Diabetes Mellitus

Respondents will complete the self-administered questionnaire with a (✔) mark in the corresponding box.

SECTION A (SOCIODEMOGRAPHIC DATA)

1. **Age (in years)**

1:1 21 – 40 □

1:2 41 – 50 □

1:3 51 – 60 □

1:4 61 – 65 □

1. Gender

2:1 Male □

2:2 Female □

2. Marital status

3:1 Married □

3:2 Single □

3:3 Widow/Widower □

3:4 Separated/Divorced □

3. Education

4:1 Primary □

4:2 Secondary □

4:3 College □

4:4 Trade or Technical School □

4:5 University □

SECTION B (CLINICAL INFORMATION)

1. Since how long do you have diabetes?

1:1 Less than 5 years □

1:2 5 – 10 years □

1:3 More than 10 years □

2. Type of diabetic treatment

2:1 Insulin □

2:2 Pills □

3. Blood glucose self-monitoring

3:1 Test blood glucose before breakfast

Yes □ No □

3:2 Test blood glucose after meals

Yes □ No □

4. Foot care

4:1 **How often do you check your feet?**

Daily □ Weekly □ Never □

5. Family history of diabetes

5:1 Yes □ No □

Thank you very much for completing the survey.

Appendix D: Diabetes Knowledge Test

Michigan Diabetes Research and Training Center's Brief Diabetes Knowledge Test

1. The diabetes diet is:
   a. the way most American people eat
   b. a healthy diet for most people
   c. too high in carbohydrate for most people
   d. too high in protein for most people

2. Which of the following is highest in carbohydrate?
   a. Baked chicken
   b. Swiss cheese
   c. Baked potato
   d. Peanut butter

3. Which of the following is highest in fat?
   a. Low fat milk
   b. Orange juice
   c. Corn
   d. Honey

4. Which of the following is a "free food"?
   a. Any unsweetened food
   b. Any dietetic food
   c. Any food that says "sugar free" on the label
   d. Any food that has less than 20 calories per serving

5. Glycosylated hemoglobin (hemoglobin A1) is a test that is a measure of your average blood glucose level for the past:
   a. day
   b. week
   c. 6-10 weeks
   d. 6 months

6. Which is the best method for testing blood glucose?
   a. Urine testing
   b. Blood testing
   c. Both are equally good

7. What effect does unsweetened fruit juice have on blood glucose?
   a. Lowers it
   b. Raises it
   c. Has no effect

8. Which should <u>not</u> be used to treat low blood glucose?
   a. 3 hard candies
   b. 1/2 cup orange juice
   c. 1 cup diet soft drink
   d. 1 cup skim milk

9. For a person in good control, what effect does exercise have on blood glucose?
   a. Lowers it
   b. Raises it
   c. Has no effect

10. Infection is likely to cause:
   a. an increase in blood glucose
   b. a decrease in blood glucose
   c. no change in blood glucose

11. The best way to take care of your feet is to:
   a. look at and wash them each day
   b. massage them with alcohol each day
   c. soak them for one hour each day
   d. buy shoes a size larger than usual

12. Eating foods lower in fat decreases your risk for:
   a. nerve disease
   b. kidney disease
   c. heart disease
   d. eye disease

13. Numbness and tingling may be symptoms of:
   a. kidney disease
   b. nerve disease
   c. eye disease
   d. liver disease

14. Which of the following is usually <u>not</u> associated with diabetes:
   a. vision problems
   b. kidney problems
   c. nerve problems
   d. lung problems

15. Signs of ketoacidosis include:
   a. shakiness
   b. sweating
   c. vomiting
   d. low blood glucose

16. If you are sick with the flu, which of the following changes should you make?
   a. Take less insulin
   b. Drink less liquids
   c. Eat more proteins
   d. Test for glucose and ketones more often

17. If you have taken intermediate-acting insulin (NPH or Lente), you are most likely to have an insulin reaction in:
   a. 1-3 hours
   b. 6-12 hours
   c. 12-15 hours
   d. more than 15 hours

18. You realize just before lunch time that you forgot to take your insulin before breakfast. What should you do now?
   a. Skip lunch to lower your blood glucose
   b. Take the insulin that you usually take at breakfast
   c. Take twice as much insulin as you usually take at breakfast
   d. Check your blood glucose level to decide how much insulin to take

19. If you are beginning to have an insulin reaction, you should:
   a. exercise
   b. lie down and rest
   c. drink some juice
   d. take regular insulin

20. Low blood glucose may be caused by:
   a. too much insulin
   b. too little insulin
   c. too much food
   d. too little exercise

21. If you take your morning insulin but skip breakfast your blood glucose level will usually:
   a. increase
   b. decrease
   c. remain the same

22. High blood glucose may be caused by:
   a. not enough insulin
   b. skipping meals
   c. delaying your snack
   d. large ketones in your urine

23. Which one of the following will most likely cause an insulin reaction:
   a. heavy exercise
   b. infection
   c. overeating
   d. not taking your insulin

DKT: Diabetes Research and Training Center

Appendix E: Letter Requesting Opinions and Suggestions of Experts to Validate the Instrument

Date

From:

Rondalyn Dennis-Bradshaw

Doctor of Nursing Practice (DNP) Student

Walden University College of Health Sciences

To:

Subject: Letter requesting the opinion and suggestion of the experts for establishing content validity of the proposed project data collection tool.

I am a doctoral student at the Walden University College of Health Sciences. I have chosen the topic "Diabetes Self-Management Education for Adults with Type 2 Diabetes Mellitus" for a capstone to be submitted to the Walden University College of Health Sciences, in partial fulfillment of the Doctor of Nursing (DNP) degree. I have enclosed:

1. Objectives of proposed project
2. Operational definitions
3. Instrument
4. Criteria checklist

I am hereby requesting you to kindly review the contents of the instrument and validate against the criteria given. I anticipate a favorable response as soon as possible.

Sincerely,

Rondalyn Dennis Bradshaw

Appendix F: Criterial Checklist for Validating the Instrument

Instructions

Kindly review all the items in the socio-demographic data, diabetic related information and provide your valuable suggestions regarding accuracy, relevancy, and appropriateness of the content. Three response columns are in the checklist, that is, strongly agree, agree and disagree. Please place a tick mark against the specific column. If there are any suggestions or comments please mention in the remarks column.

Section A. Sociodemographic Data

Question No.	Strongly Agree	Agree	Disagree	Remarks
1				
1:1				
1:2				
1:3				
1:4				
2				
2:1				
2:2				
3				
3:1				

(table continues)

Question No.	Strongly Agree	Agree	Disagree	Remarks
3:2				
3:3				
3:4				
4				
4:1				
4:2				

Section B. Clinical Information

Question No.	Strongly Agree	Agree	Disagree	Remarks
4:3				
4:4				
4:5				
1				
1:1				
1:2				
1:3				
2				
2:1				
2:2				

(table continues)

Question No.	Strongly Agree	Agree	Disagree	Remarks
3				
3:1				
3:2				
4				
4:1				
5				
5:1				

Appendix G: Teaching Outline

Topic: Diabetes Self-Management Education

Place: Community Health Center

Audience: Patients diagnosed with Type 2 diabetes

Duration: 45-minutes to 1 hour session

Method of teaching: Group session

Teaching aids: Prepared printed handouts on diabetes self-management and pictures that are included in printed educational materials.

General Objective:

At the end of the diabetes educational session participants will gain knowledge and adequate understanding of the importance of diabetes self-management that will motivate and empower them to actively participate in self-management behaviors.

Specific Objectives:

On completion of the educational session the participants will be able to:

1. State the meaning of self-management
2. Explain the meaning of Diabetes Mellitus
3. Differentiate between the main two types of Diabetes Mellitus
4. Discuss the signs and symptoms of hypo/hyperglycemia
5. Know blood sugar goals
6. Know importance of keeping a blood sugar diary
7. List the actions to take on sick days
8. Explain the goal of meal planning for Diabetes

9. Choose healthy foods for diabetic diet
10. Demonstrate reading of food labels
11. Enlist actions for dining out
12. Discuss important points to remember during exercises
13. Explain effect of Diabetes on the feet
14. Describe signs and symptoms of poor blood flow in the feet
15. Enumerate tips for good foot care

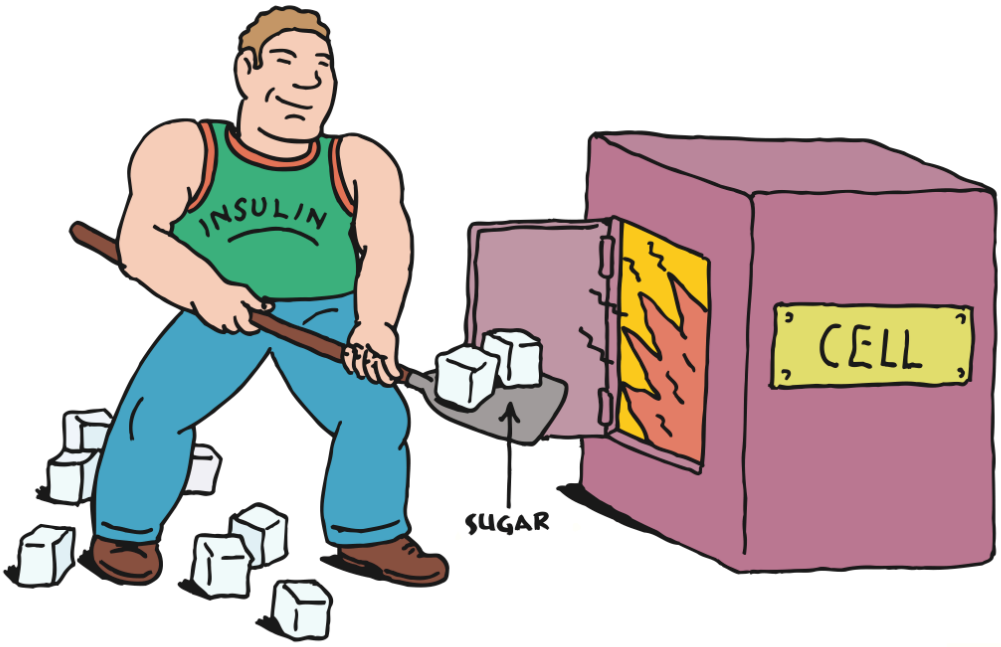
WHAT IS DIABETES?

Diabetes means you have too much sugar in your blood. The medical word for sugar in the blood or blood sugar is *glucose*, but most people just say *sugar*.

Your body changes most of the food you eat into sugar (glucose). Sugar travels in your blood to all the cells in your body. Your body makes a chemical called *insulin* to help sugar move from your blood into your cells. Your cells need sugar to give you energy and keep you healthy.

When you have diabetes:

- ☐ your body does not make insulin
- ☐ your body does not make enough insulin, or
- ☐ the insulin you make doesn't work right



Blood sugar levels stay high if you don't have enough insulin to move sugar from your blood into your cells. Over time, high blood sugar levels that are not lowered cause diabetes.

The most common types of diabetes are type 1 and type 2.

Type 1 diabetes

In type 1 diabetes, the body cannot make insulin. Type 1 diabetes occurs more often in children and young adults than in older adults. People with type 1 diabetes must inject insulin to control their blood sugar.

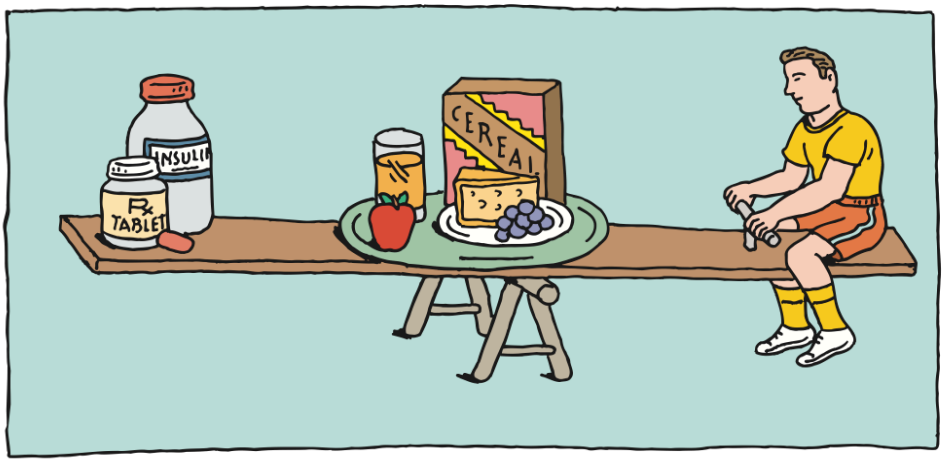
Type 2 diabetes

In type 2 diabetes, the body can make some insulin, but not enough. Or, the insulin the body makes does not work right.

Type 2 diabetes often starts in adults, but children can have it too. It is more common in overweight people or if someone in the family has diabetes.

Type 2 diabetes is controlled by balancing when and how much you eat with:

- ☐ how active you are
- ☐ your weight, and
- ☐ the diabetes medicine you take



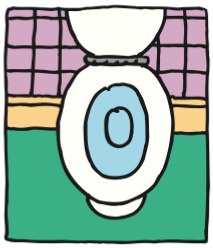
High blood sugar

Because insulin isn't working right, sugar in your blood may spill into your urine. High blood sugar and sugar in the urine may cause problems, such as:

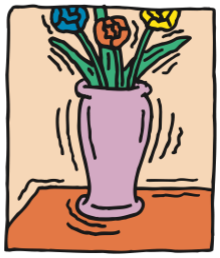
feeling tired

weight loss

feeling thirsty

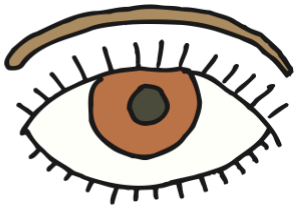


a need to urinate often



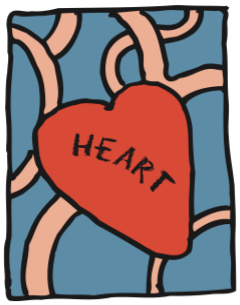
blurry vision

Controlling diabetes is important. You can have serious health problems when your blood sugar is out of control, such as:



eye problems – even blindness

heart disease



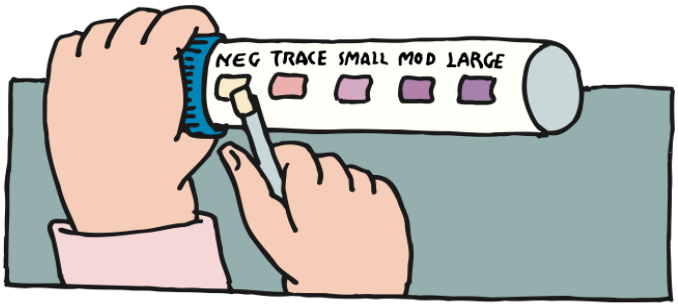
foot problems – even losing a foot or leg

Blood sugar and ketone tests

You can have a high blood sugar problem but not know it. That's why it is important to check your blood sugar often.

Most people check their blood sugar by testing a drop of their blood in a special meter.

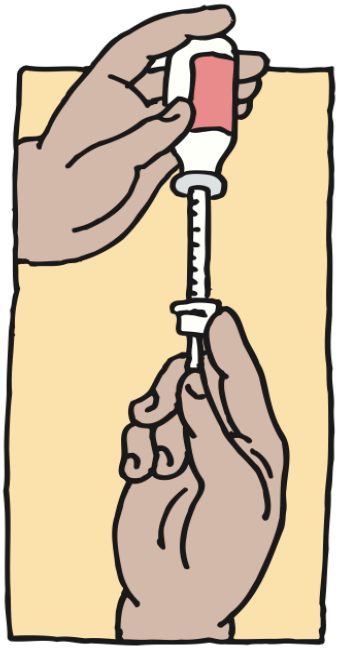
Another important blood test is the A1C. This test shows your average blood sugar level over the past 2 to 3 months.



A urine test is used most often to tell if you have ketones in your urine. Ketones mean your blood sugar level is very high. Call your doctor right away if you have ketones. You may be having a medical emergency.

Medicine for diabetes

Most people with diabetes take medicine to control their blood sugar. Diabetes pills work in different ways to help lower blood sugar. If you take a pill for diabetes, take it at the same time every day. And learn what to do if you forget to take your pill. You don't want to take a missed pill with your next pill.



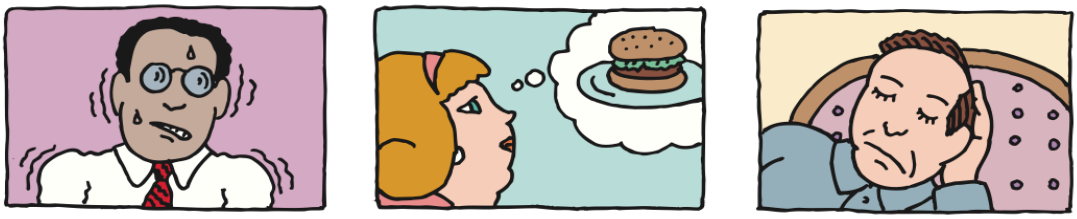
If you take insulin, you will learn how, where, and when to inject it. Many people use a needle and syringe to inject insulin. Insulin pens and insulin pumps are also used. It is important to know where to keep your insulin and how long you can use it. Call your doctor or health clinic right away if you have questions about using insulin.

Low blood sugar

Insulin or pills help control diabetes but can sometimes cause low blood sugar. This can happen if you:

- ☐ are too active
- ☐ don't eat enough
- ☐ skip a meal
- ☐ take too much medicine

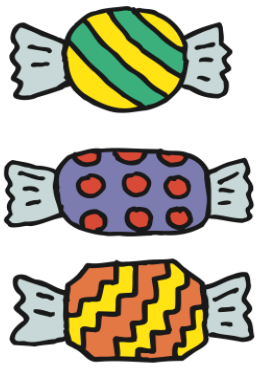
The signs or symptoms of low blood sugar include



feeling shaky, dizzy, sweaty, upset, hungry, or tired.

If you have a low blood sugar problem, it's important to eat or drink 15 grams of a fast-acting food high in sugar right away, such as:

- ☐ 1/2 can of regular (not diet!) soda
- ☐ 1 tablespoon (or two packets) of real sugar
- ☐ 3 hard candies you can eat quickly



Blood sugar goals

Your doctor will help you decide the blood sugar goals that are best for you. Write your goals in the table below.

Blood Sugar (Glucose) Goals*

Time	Adults With Diabetes	Your Goal
Before Meals	70 to 130 mg/dL	
2 Hours After Meals (postprandial)	Less than 180 mg/dL	
A1C	7% or less	

*American Diabetes Association guidelines (plasma values)

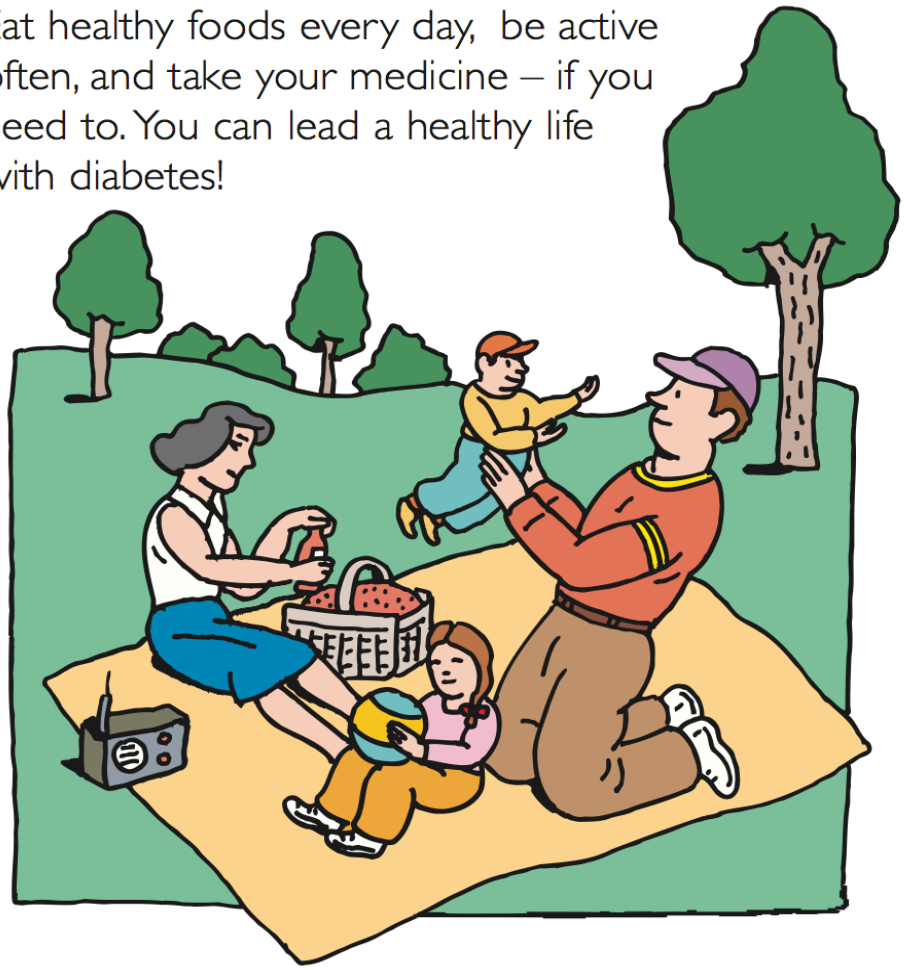
Before you leave the doctor's office or clinic, be sure you understand:

- ☐ how to use your meter
- ☐ what your blood test results mean, and
- ☐ what your blood sugar goals are

Call your doctor's office anytime you have questions about how to control your diabetes.

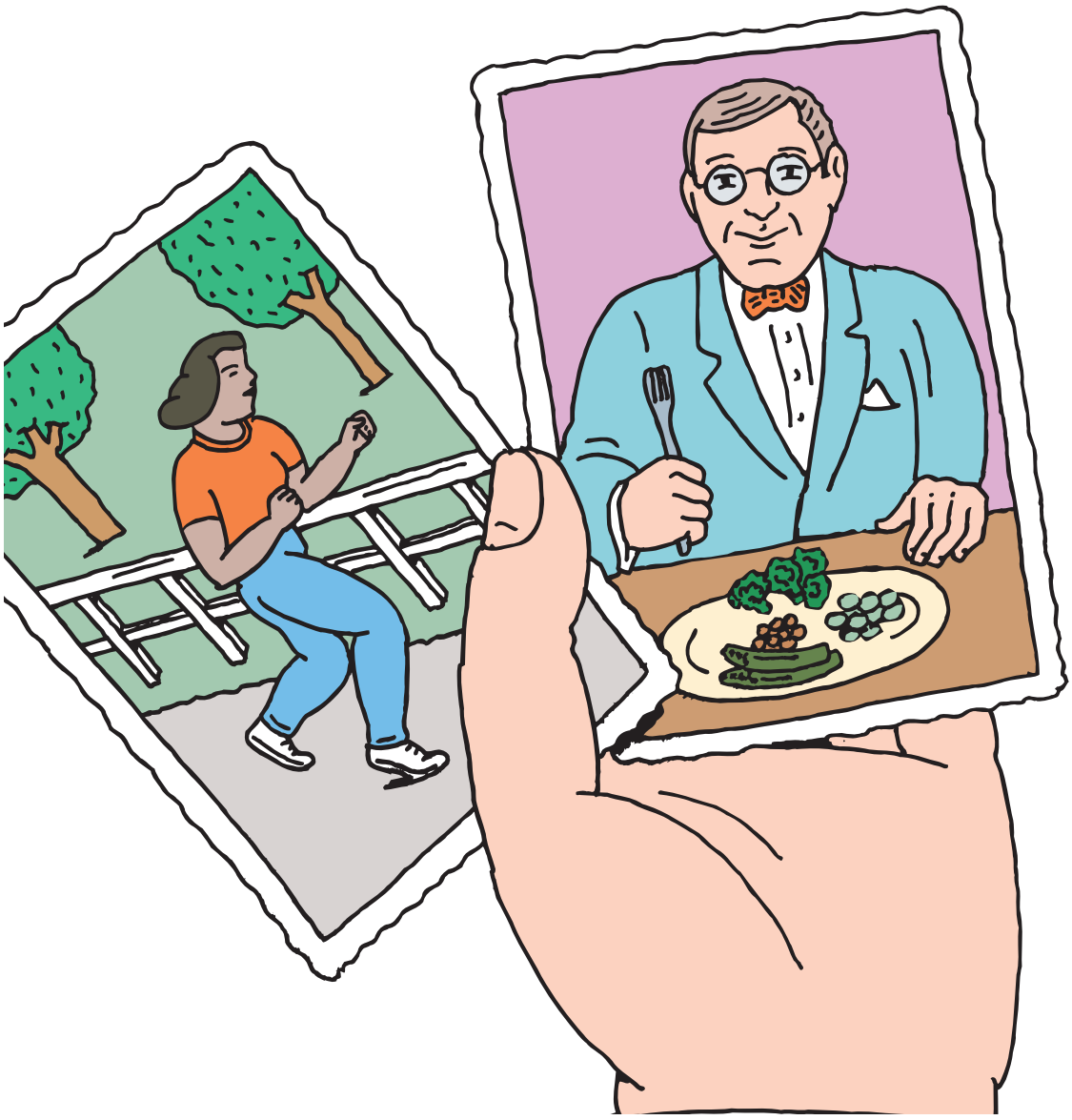
It can be hard at times to do the things you need to do to control diabetes. Join a support group. Tell your family and friends what they can do to help.

Diabetes cannot be cured, but it can be controlled. Eat healthy foods every day, be active often, and take your medicine – if you need to. You can lead a healthy life with diabetes!



Always talk to your doctor before making any changes in your diabetes treatment plan.

UNDERSTANDING BLOOD SUGAR



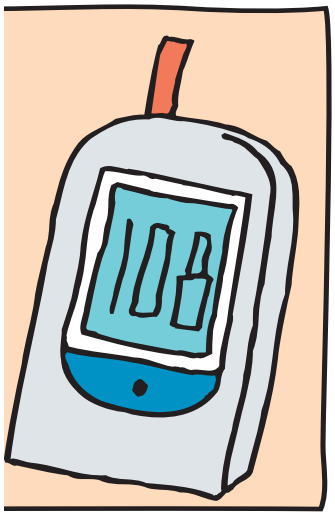
Learning About Diabetes, Inc., www.learning aboutdiabetes.org

The best way to stay healthy with diabetes is to control the level of sugar in your blood. The medical word for sugar in the blood or blood sugar is glucose.

Your goal is to keep your blood sugar as close to normal as possible without having high or low blood sugar problems.

Your doctor will help you decide what your blood sugar goal should be.

Blood sugar and urine testing

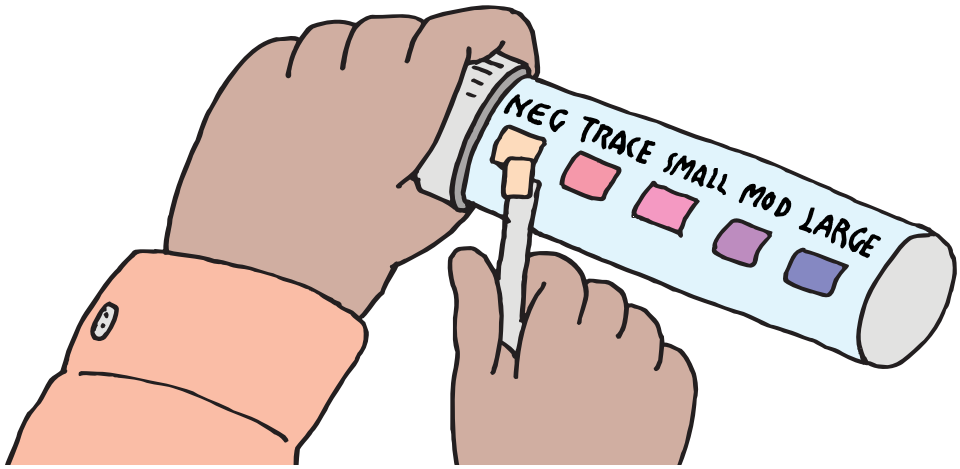


Checking your blood sugar tells you how well you are controlling your diabetes.

Blood sugar is usually tested by putting a drop of blood on a special strip that is read by a meter.

An A1C test is another blood sugar test. This test shows your average blood sugar level over the last 2 to 3 months.

A urine test will show if there is sugar in urine, but its main job is to show if your urine has ketones. Ketones in urine mean your blood sugar is out of control. Call your doctor right away.

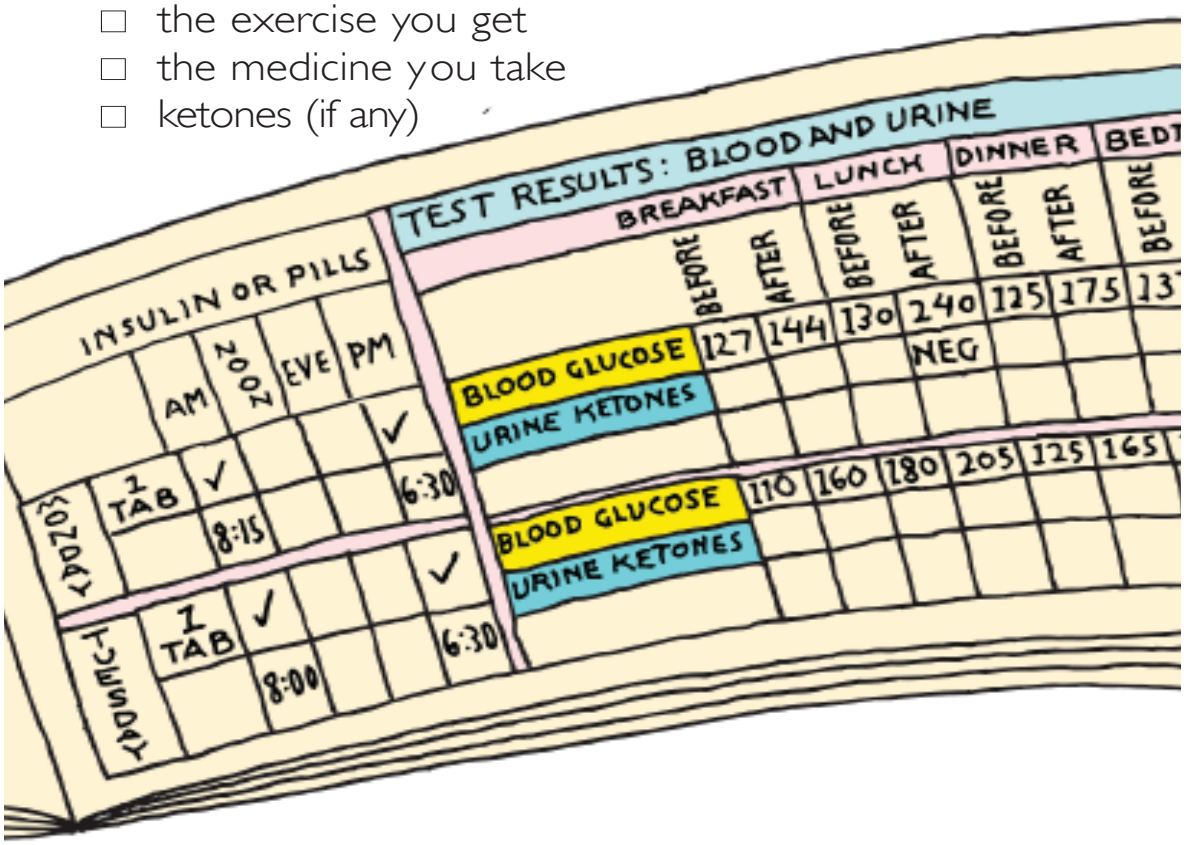


2

Your blood sugar diary

Keep daily records in a diary or on a record sheet of:

- ☐ your blood sugar levels
- ☐ the food you eat
- ☐ the exercise you get
- ☐ the medicine you take
- ☐ ketones (if any)



A diary works best if you write each thing down as you do it. That way you won't forget.

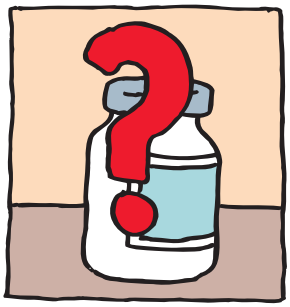
Write down any special things you did that may affect your blood sugar numbers. For example, some foods can cause blood sugar to be higher and exercise may cause blood sugar to be lower.

High blood sugar

Blood sugar can be high if you:

eat too much food

are under stress



don't take enough medicine

are sick

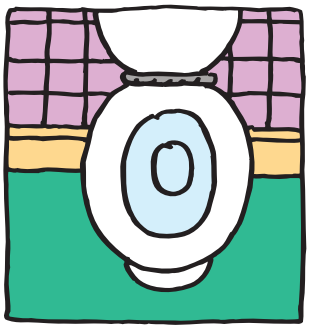
Learn how medicine, food, exercise, and stress affect your blood sugars. Then you can do something about it.

If you have high blood sugar often
or at certain times of the day,
tell your doctor or diabetes educator.

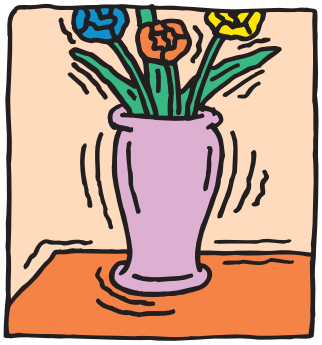
You should also tell them if and when you have
symptoms (signs) of high blood sugar, such as:

feeling tired

urinating a lot

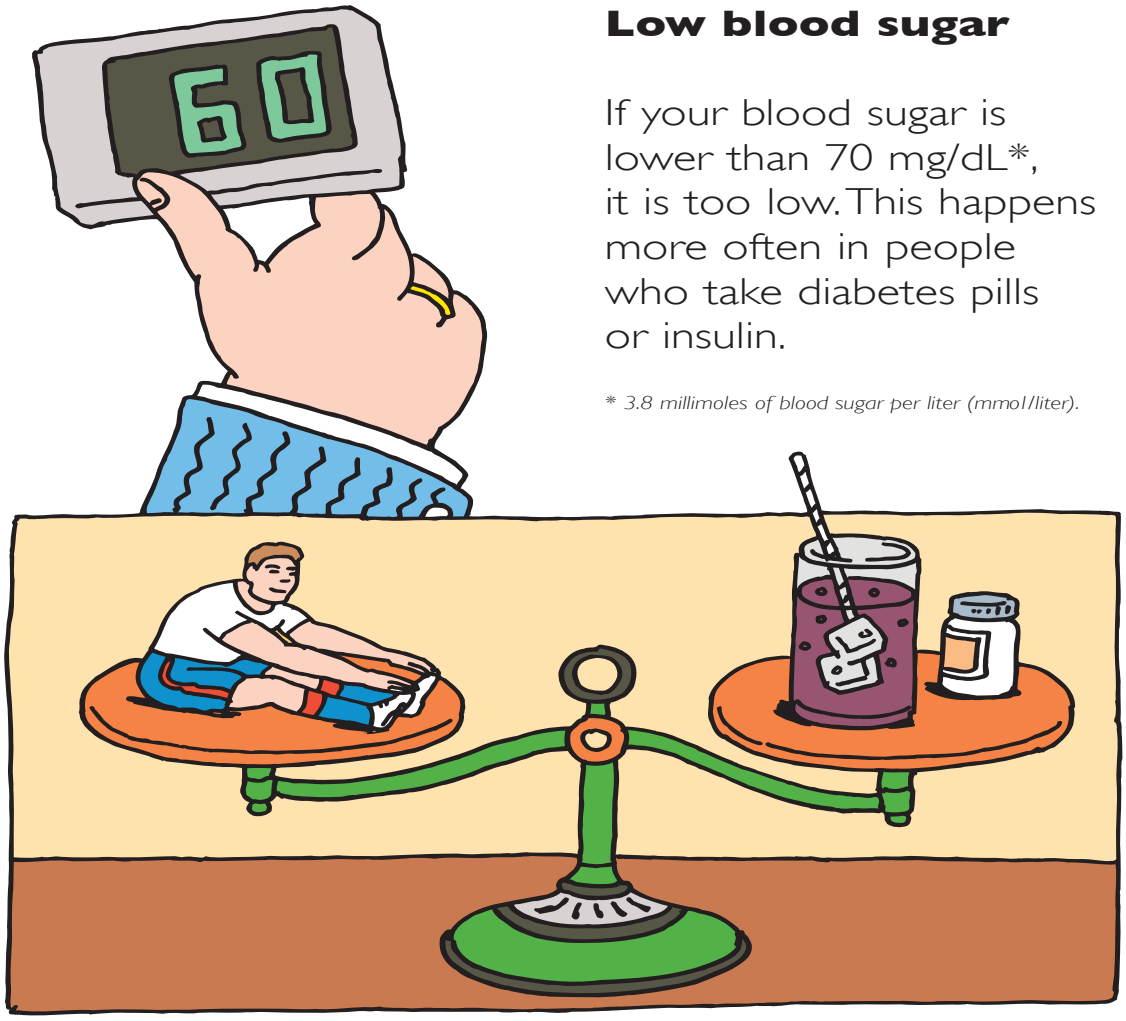


feeling thirsty



blurry vision

You may need to change your medicine, meal plan,
or how active you are.



Low blood sugar

If your blood sugar is lower than 70 mg/dL*, it is too low. This happens more often in people who take diabetes pills or insulin.

** 3.8 millimoles of blood sugar per liter (mmol/liter).*

Low blood sugar can also happen when medicine, food, and exercise don't work well together. It can happen if you:

- ☐ exercise a lot
- ☐ don't eat on time
- ☐ don't eat enough food
- ☐ take too much medicine

Low blood sugar can make you feel:

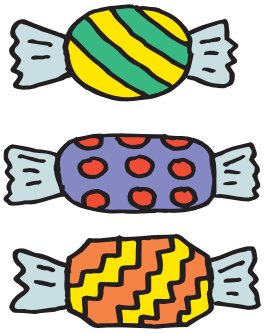
- ☐ shaky
- ☐ sleepy or tired
- ☐ sweaty or clammy
- ☐ upset or confused
- ☐ hungry
- ☐ dizzy
- ☐ restless during night time sleep

If you feel symptoms (signs) of low blood sugar, check your blood sugar right away.

If you have low blood sugar, treat it right away with 15 grams of a fast-acting, high-sugar food, such as:

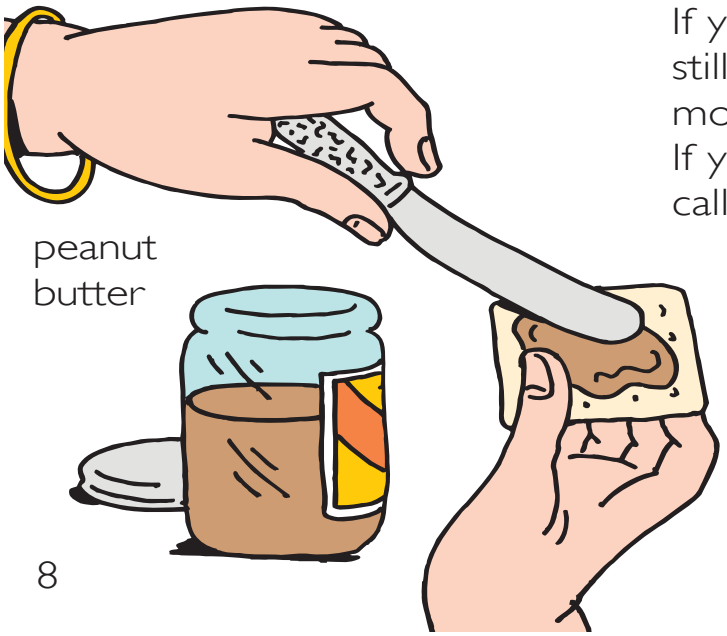
4 ounces (1/2 cup) of fruit juice or 1/2 can of regular (not diet!) soda

3 glucose tablets or 15 grams of gel



3 pieces of hard candy you can eat quickly

Check your blood sugar again in 15 minutes. If your blood sugar is still low, eat or drink one more fast-acting food. If you still don't feel well, call your doctor.



peanut butter

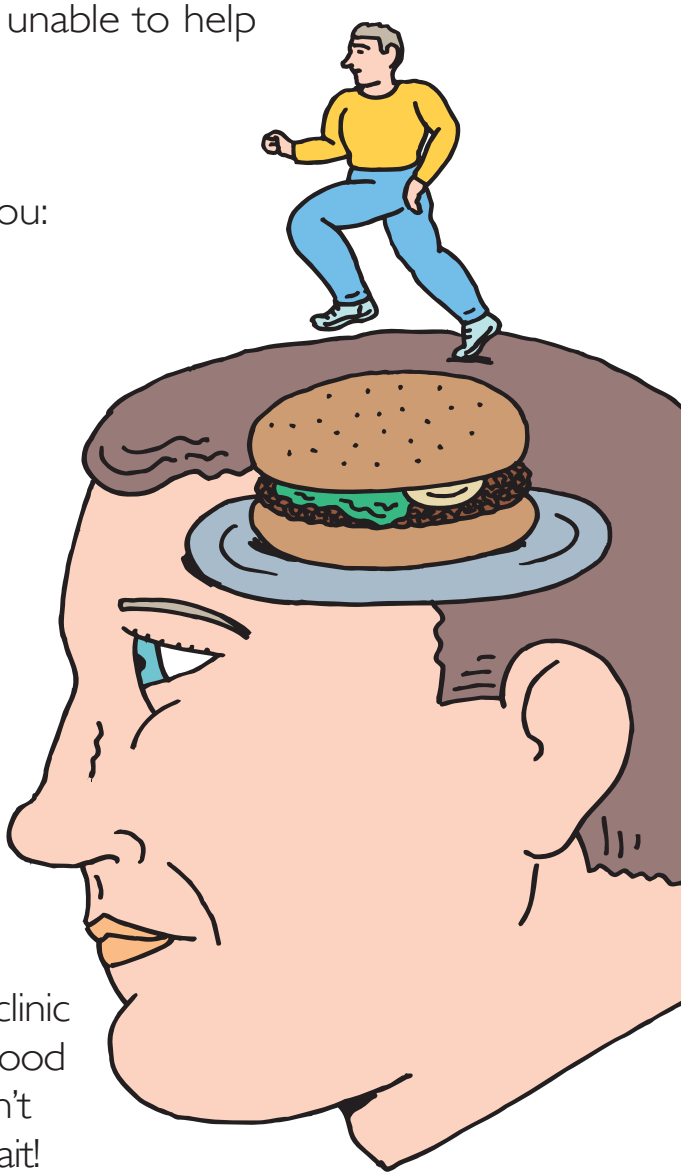
8

Write down your blood sugar number(s) in your diary.

If you have a low blood sugar problem but can't test your blood right away, eat or drink a fast-acting sugar food anyway. Don't wait. You could pass out or be unable to help yourself.

Find out why you had a low blood sugar. Maybe you:

- ☐ exercised too much
- ☐ didn't eat enough
- ☐ didn't eat the right kinds of foods



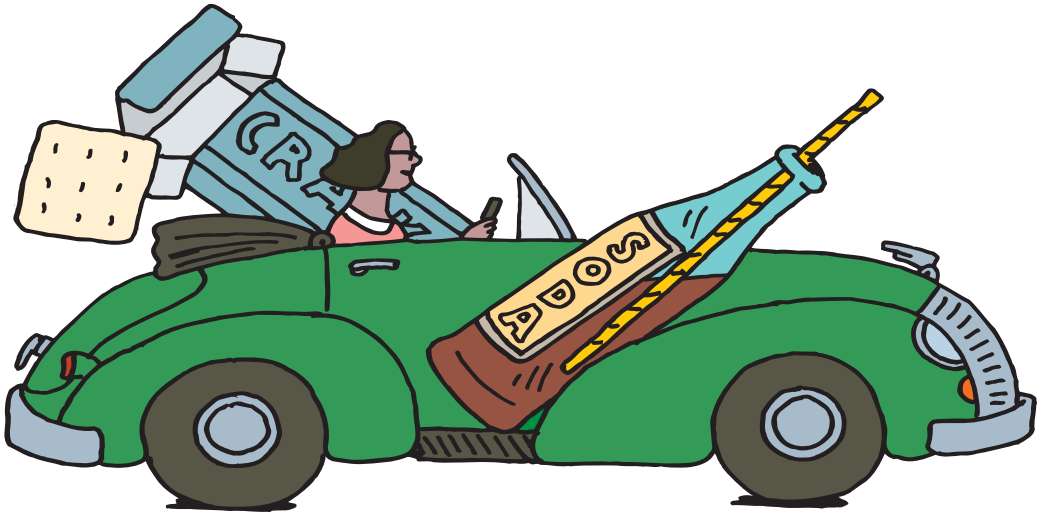
Your goal is to prevent high or low blood sugar problems. If you know what causes your highs and lows, you can solve the problem by making changes in your food, medicine, or activity (exercise) program.

Call your doctor or health clinic if you have a high or low blood sugar problem and you don't know what to do. Don't wait!

Your family members and friends should also know the signs (symptoms) of low blood sugar and how to help you treat it.

Show them:

- ☐ what symptoms to look for
- ☐ how you treat low blood sugar
- ☐ where you keep your diabetes supplies
- ☐ where emergency phone numbers are kept

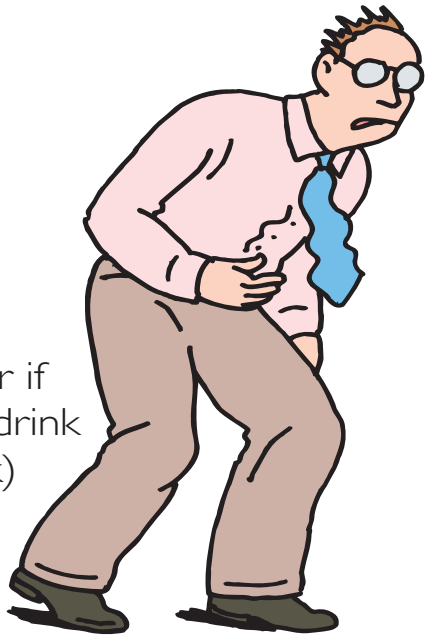


Never drive if you have symptoms of low blood sugar. Test your blood sugar before you drive and often whenever you travel.

If you take pills or insulin, make sure you keep have them with you when you are away from home.

Pack a can of regular soda, crackers, hard candy you can chew, glucose tablets or gel for travel.

When you are sick...

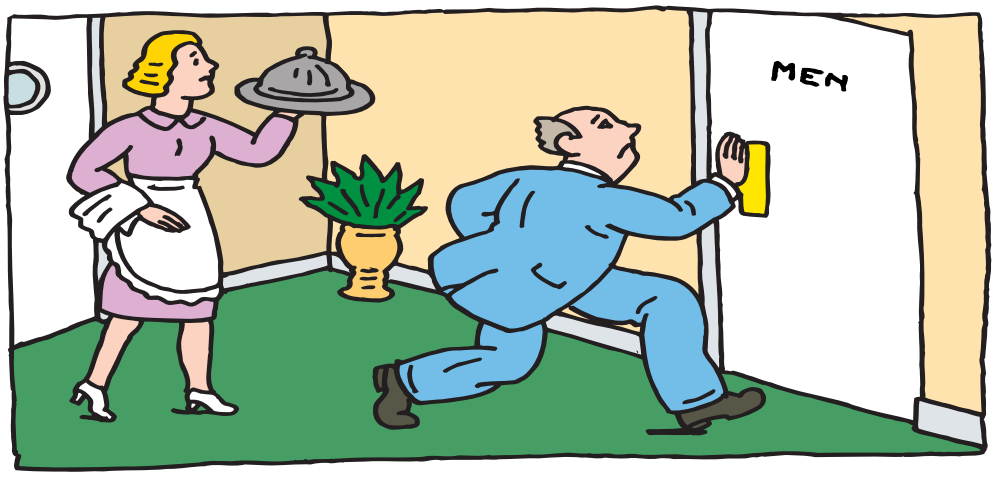


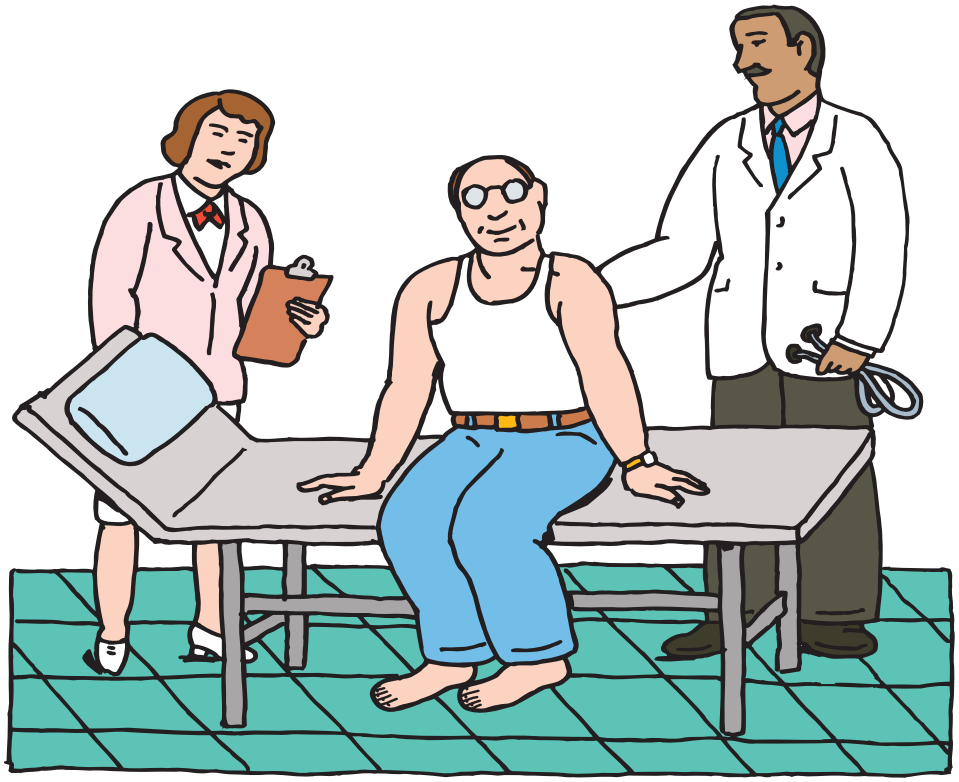
You will need a special plan for days you are sick. On sick days:

- ☐ always take your medicine
- ☐ test your blood sugar and for ketones at least every 4 hours
- ☐ drink water and fluids with sugar if you can't eat (it's important to drink a lot of fluids when you are sick)

Call your doctor if you:

- ☐ can't eat
- ☐ are vomiting
- ☐ have severe diarrhea
- ☐ have blood sugar numbers outside of your goal range for more than a day
- ☐ have ketones



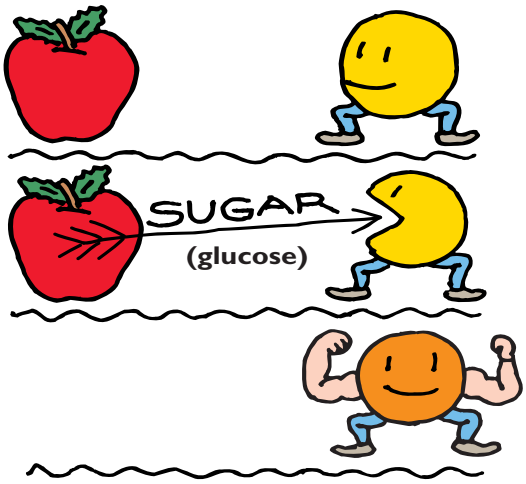


Controlling diabetes every day can be hard at times. But keeping your blood sugar as close to normal as possible will help prevent problems.

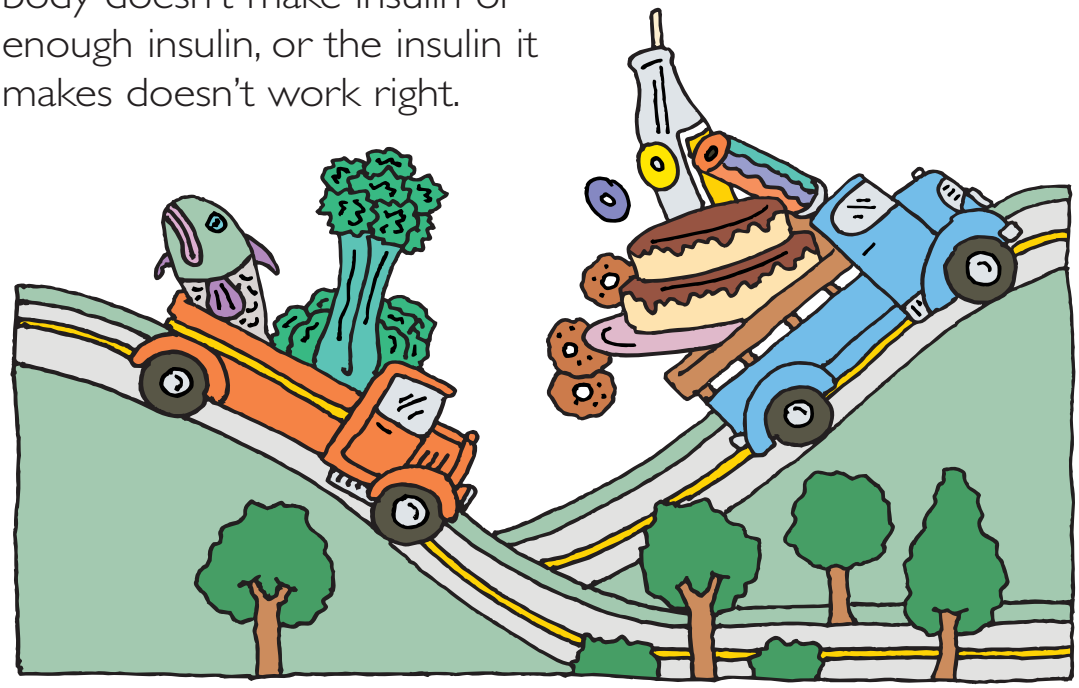
Learn as much as you can about good diabetes care. Call your doctor's office or health clinic if you have any questions. They are there to help!

DIABETES
& HEALTHY EATING

Food gives you the energy you need for healthy living. Your body changes most of the food you eat into a sugar called *glucose.*



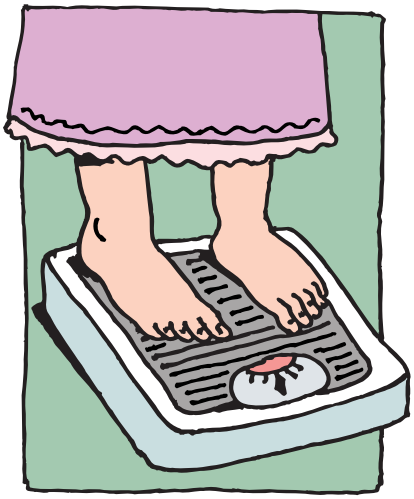
Insulin helps your cells get the sugar (glucose) you need for energy. Insulin also helps keep your blood sugar levels normal. When you have diabetes, your body doesn't make insulin or enough insulin, or the insulin it makes doesn't work right.

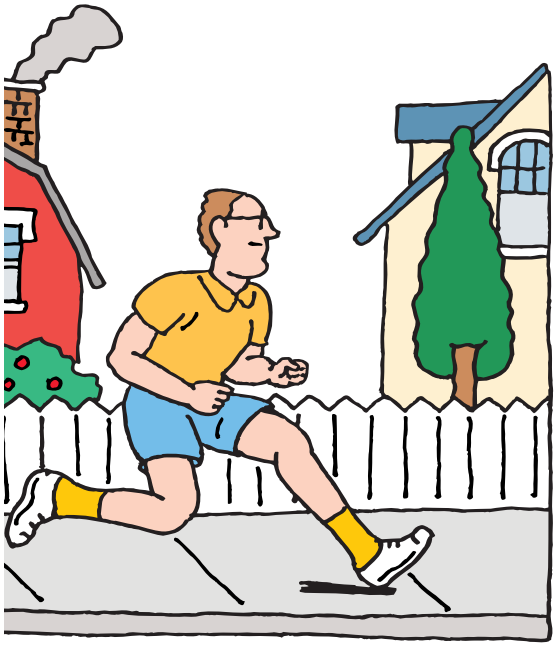


Even though your insulin does not work right, healthy eating can help keep your blood sugar from becoming too high or too low.

Planning Your Meals

Healthy eating includes planning your meals, choosing healthy foods, and watching your weight. It also includes balancing what you eat and how much you eat with how active you are.



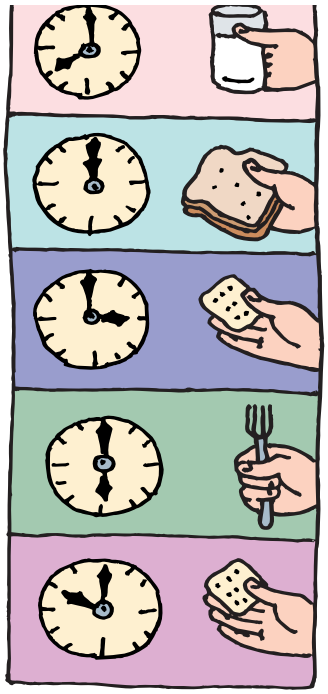


Your doctor, diabetes educator, or a dietitian will help you plan your meals.

What you eat depends on:

- ☐ how much you weigh
- ☐ how active you are
- ☐ your blood sugar levels
- ☐ the foods you like to eat

The foods you eat change your blood sugar levels in different ways. You will learn how to make healthy food choices that help control your blood sugar.



If you take diabetes pills or insulin, you will also learn how to space your eating throughout the day. This will help your medicine keep your blood sugar under control.

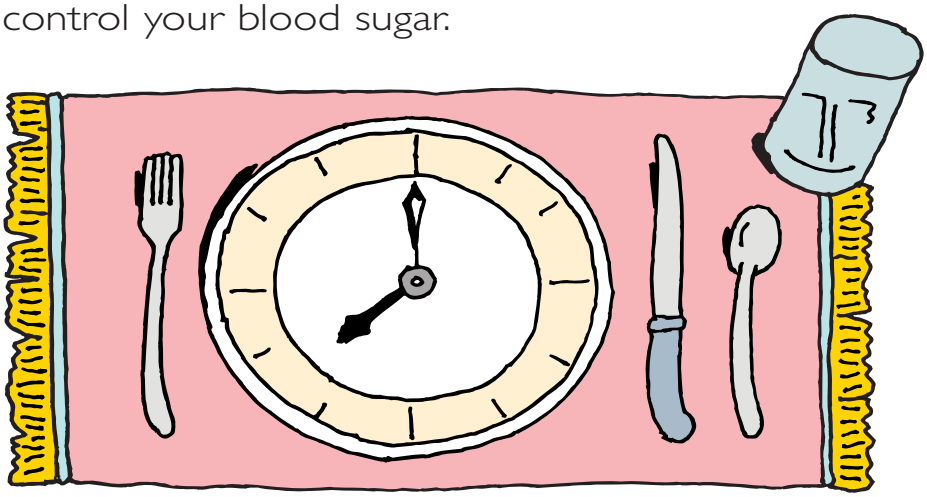
Some people, especially active people, may need snacks in between their regular meals.

Follow your meal plan.
Try not to skip any meals or snacks.

Your goal is to:

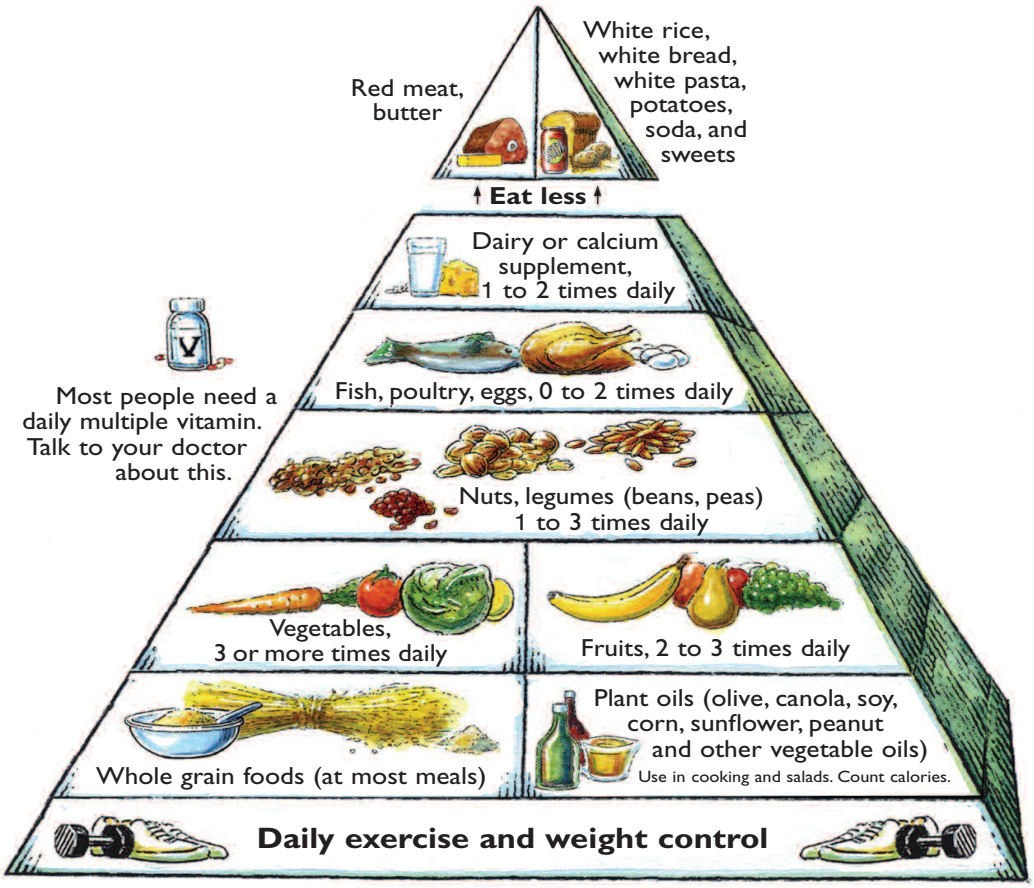
- ☐ eat healthy foods
- ☐ eat the right amounts of food
- ☐ eat your food at the right times

to control your blood sugar.



Choosing Healthy Foods

A healthy eating pyramid like the one below will help you control your blood sugar.



Your goal is to eat a healthy balance of carbohydrate, protein, and fat. Carbohydrate is the body's main source of energy. Health experts recommend about half of the calories you eat each day be from foods high in carbohydrate, such as whole grains.

High-fiber foods

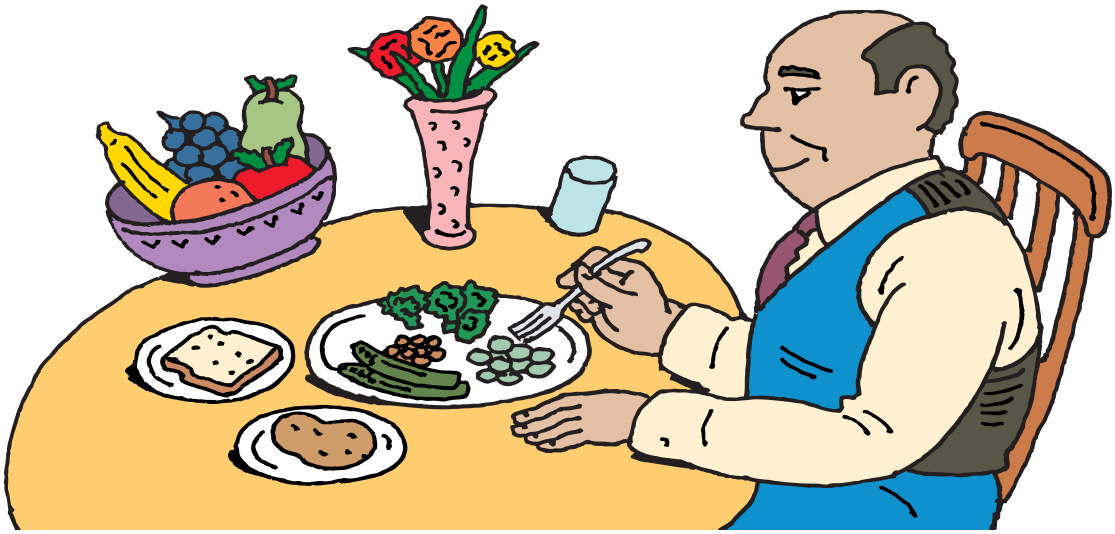
Eating foods high in fiber helps control blood sugar. Fiber can also make you feel full, which helps you to eat less.

High-fiber foods include:

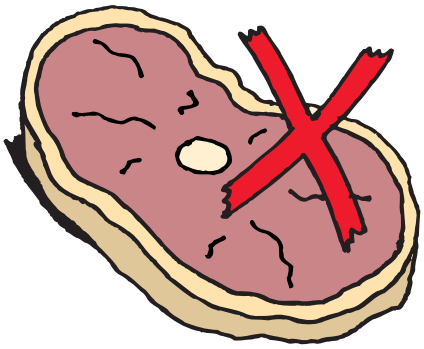
- ☐ fresh fruits and vegetables
- ☐ whole grain cereals and breads
- ☐ beans, peas, lentils, and legumes
- ☐ brown rice, barley, and oats

Foods low in fat and salt

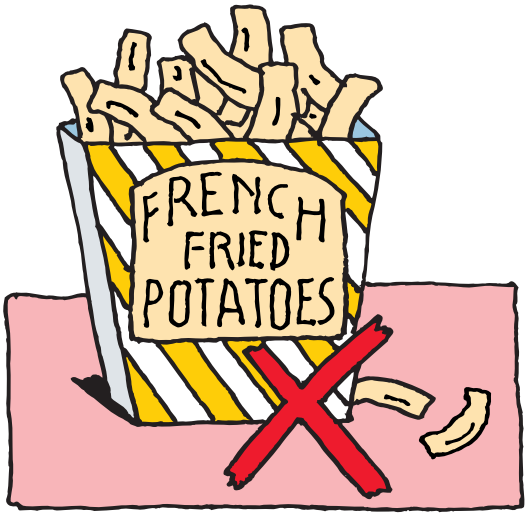
Fatty foods have more calories than other foods. Eating low-fat foods helps you control your weight. Diabetes can be harder to control if you are overweight. Eating less fat can also help prevent heart disease.



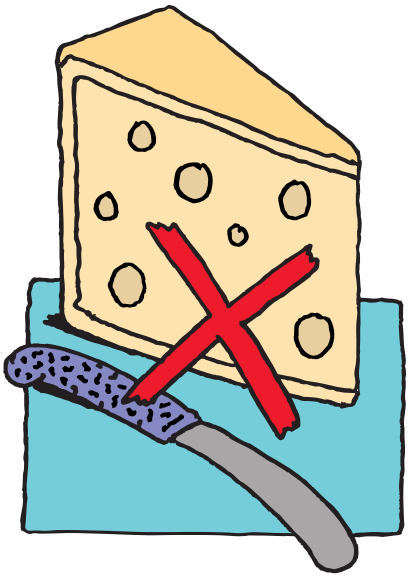
Eat less fat



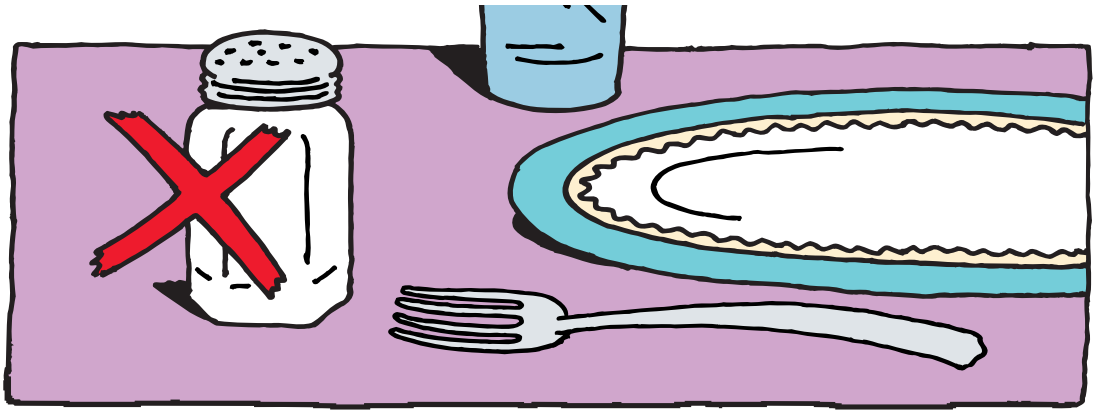
- ☐ cut back on butter, margarine, oil, salad dressing, and sour cream when eating or cooking



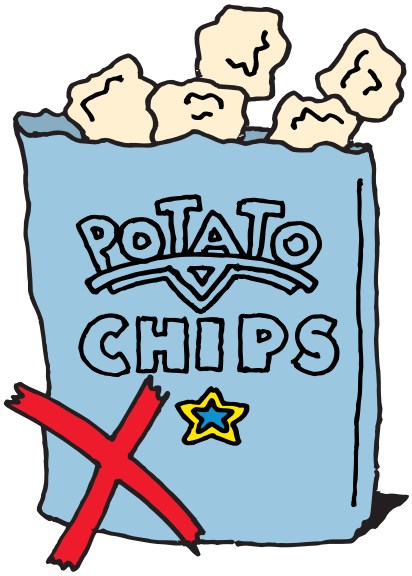
- ☐ cut back on fatty meats, whole milk, cheese, fried foods, peanut butter, and chips
- ☐ be careful about what you order in fast-food restaurants (fast foods often have a lot of fat)



Other ways to cut the fat in your diet: Remove the skin from chicken, and trim the fat from meat before cooking or eating it. Drink fat-free, low-fat or skim milk. Eat low-fat or fat-free cheeses and desserts. Bake, grill, or broil food instead of frying it.

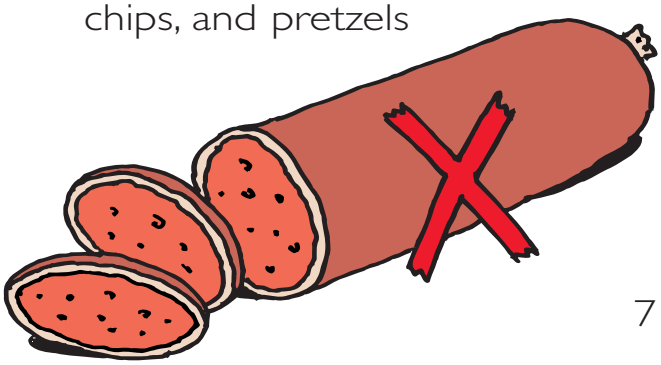


High blood pressure is a common problem in people with diabetes. Your doctor may ask you to eat less salt if you have high blood pressure.



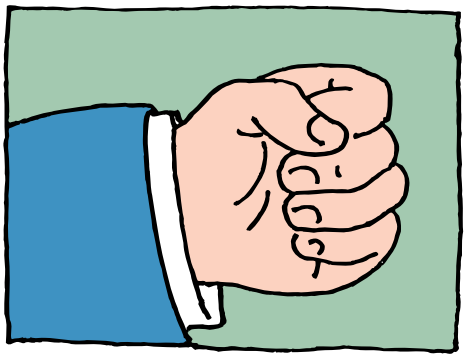
Ways to cut down on salt:

- ☐ don't add salt to the food you eat or cook
- ☐ don't put the salt shaker on the table
- ☐ use salt-free seasonings such as garlic powder, onions, hot pepper, spices and herbs
- ☐ stay away from high-salt foods such as lunch meat, pickles, chips, and pretzels

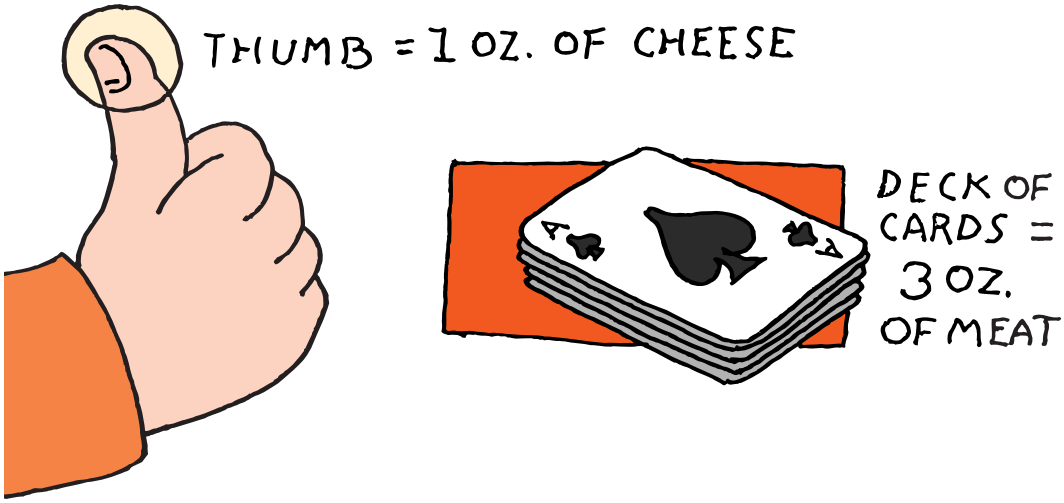


How Much Should You Eat?

Learn about serving sizes. It is an important way to help control blood sugar levels. One way to know how much food you are eating is to weigh or measure it. Use a measuring cup and spoons or a scale.



Most people eat more than they think. After measuring foods for a while, you will often be able to know a serving size just by looking at it.



Read Food Labels

Most foods have a nutrition label. Food labels are a big help in choosing foods that fit into your meal plan.

Always read food labels when you shop.

Check serving size

Check total carbohydrate

(Sugars are part of total carbohydrate. Don't count twice.)

Nutrition Facts

Serving Size: 1cup (228g)
Servings Per Container: 2

Amount Per Serving	
Calories 250	Calories from Fat 110
	% Daily Value*
Total Fat 12g	18%
Saturated Fat 3g	15%
Trans Fat 3g	0%
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 27g	9%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

Illustration only.

Low fat is good

Eat less of these

High fiber is good

(3g or more)

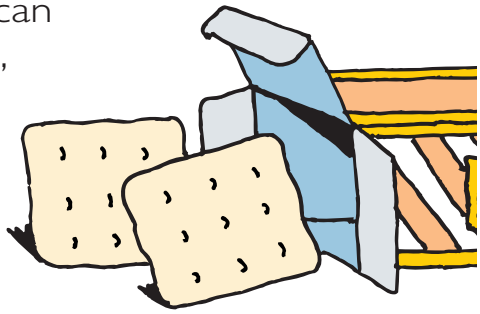
Write It Down

Keep a food diary. This will help you see how your blood sugar is changed by *what* you eat, *when* you eat, and *how much* you eat.

Dining Out

If your have diabetes, plan ahead if you eat out. This will help you control you blood sugar. Here are some ways to plan ahead:

- ☐ find out what is being served, in case you need to bring something that fits into your meal plan
- ☐ drink water or diet soda, if you can
- ☐ in restaurants, order food grilled, baked, or broiled – not fried
- ☐ ask for sauces and dressing to be served on the side
- ☐ always carry a snack in case your meal plans change



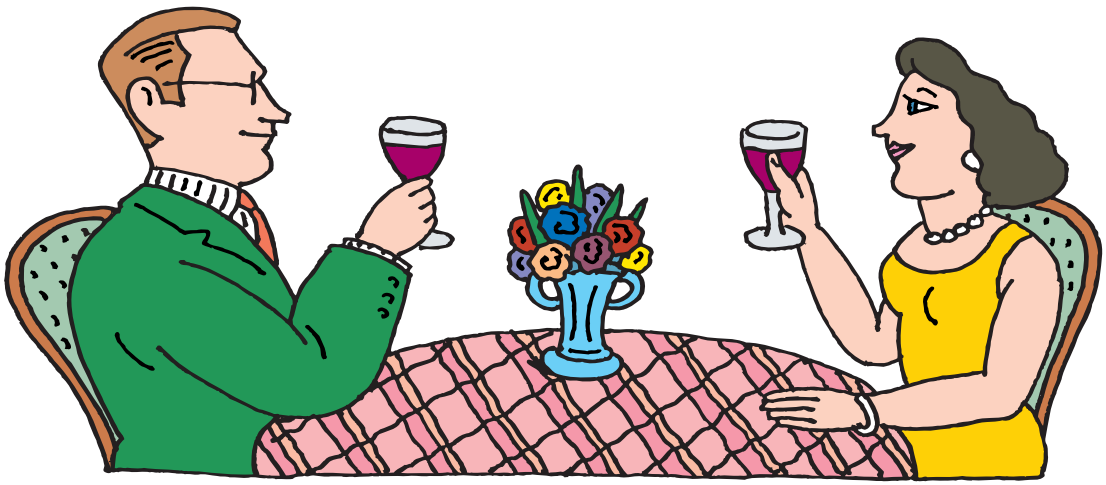
About Alcohol

Talk to your doctor if you drink alcohol. If you take insulin or diabetes pills, your blood sugar level may drop too low after you drink alcohol.

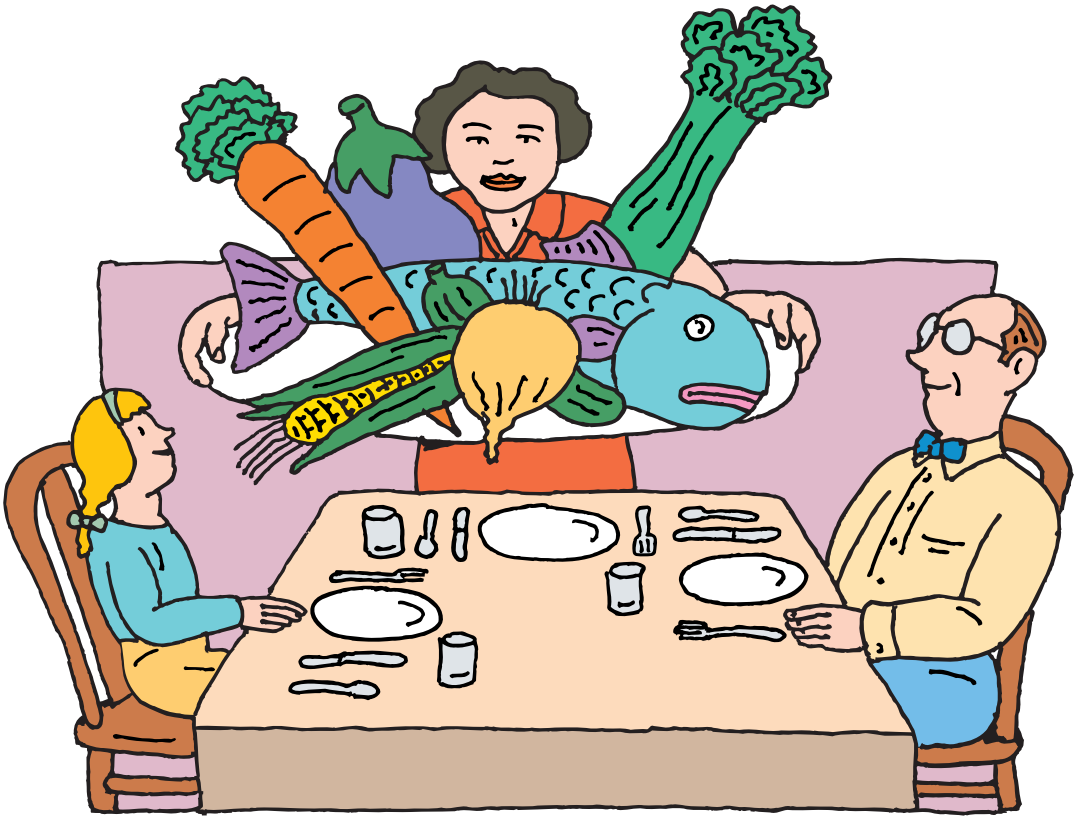
Don't have more than one or two drinks a day. Be sure to test your blood sugar after drinking.

If you drink alcohol:

- ☐ drink with a meal or right after eating
- ☐ drink slowly
- ☐ choose light beer or white wine
- ☐ mix drinks with club soda, diet soda, or water



Keep your diabetes under control! Balance when you eat, what you eat, and how much you eat with regular exercise and taking your medicine.

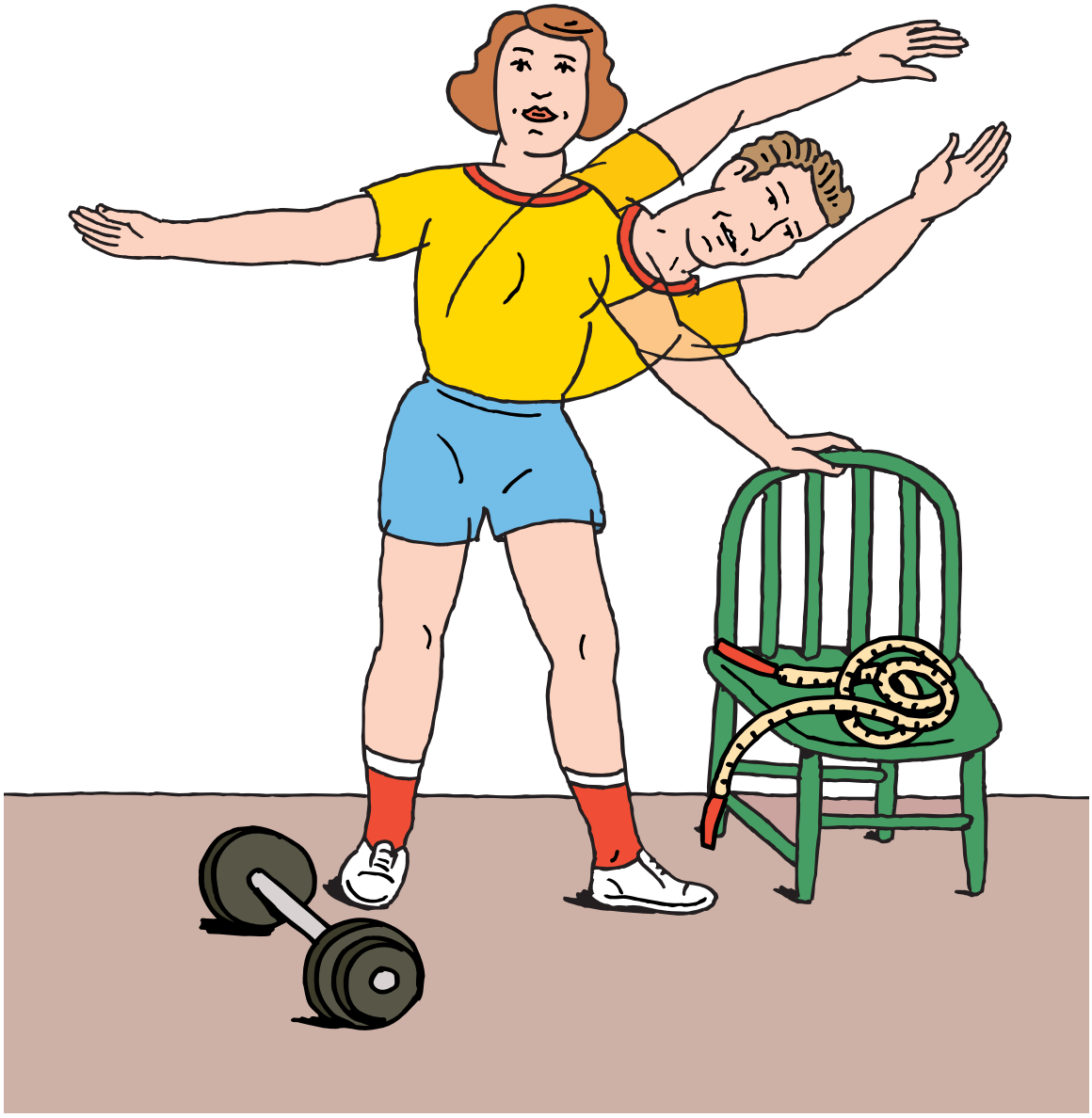


Healthy eating is important for people with diabetes and everyone else. You and your family can enjoy the same tasty, healthy foods.

Always talk to your doctor before making any changes in your diabetes treatment plan.

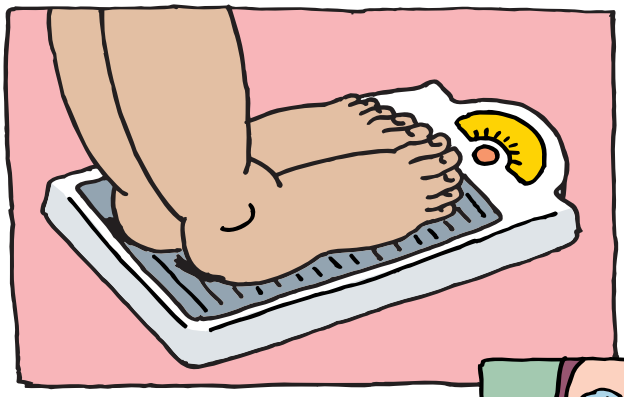
Visit www.learningaboutdiabetes.com for more free diabetes patient education programs.

EXERCISE AND DIABETES



Learning About Diabetes, Inc., www.learning aboutdiabetes.org

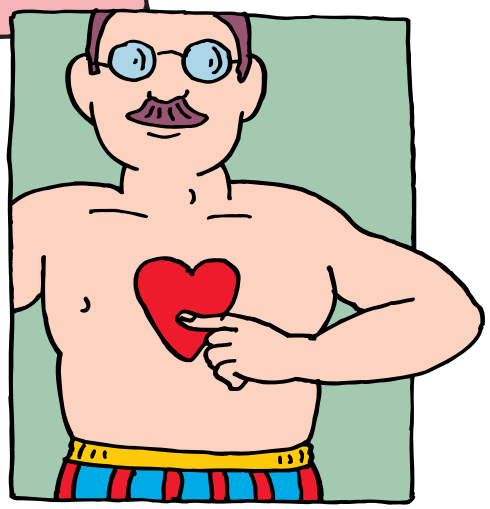
Exercise is one way to help control diabetes. High blood sugar levels and being overweight can make diabetes worse.



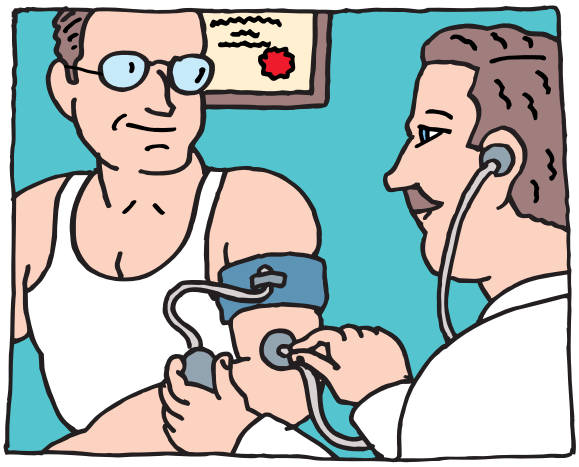
Exercise helps to:

☐ control weight

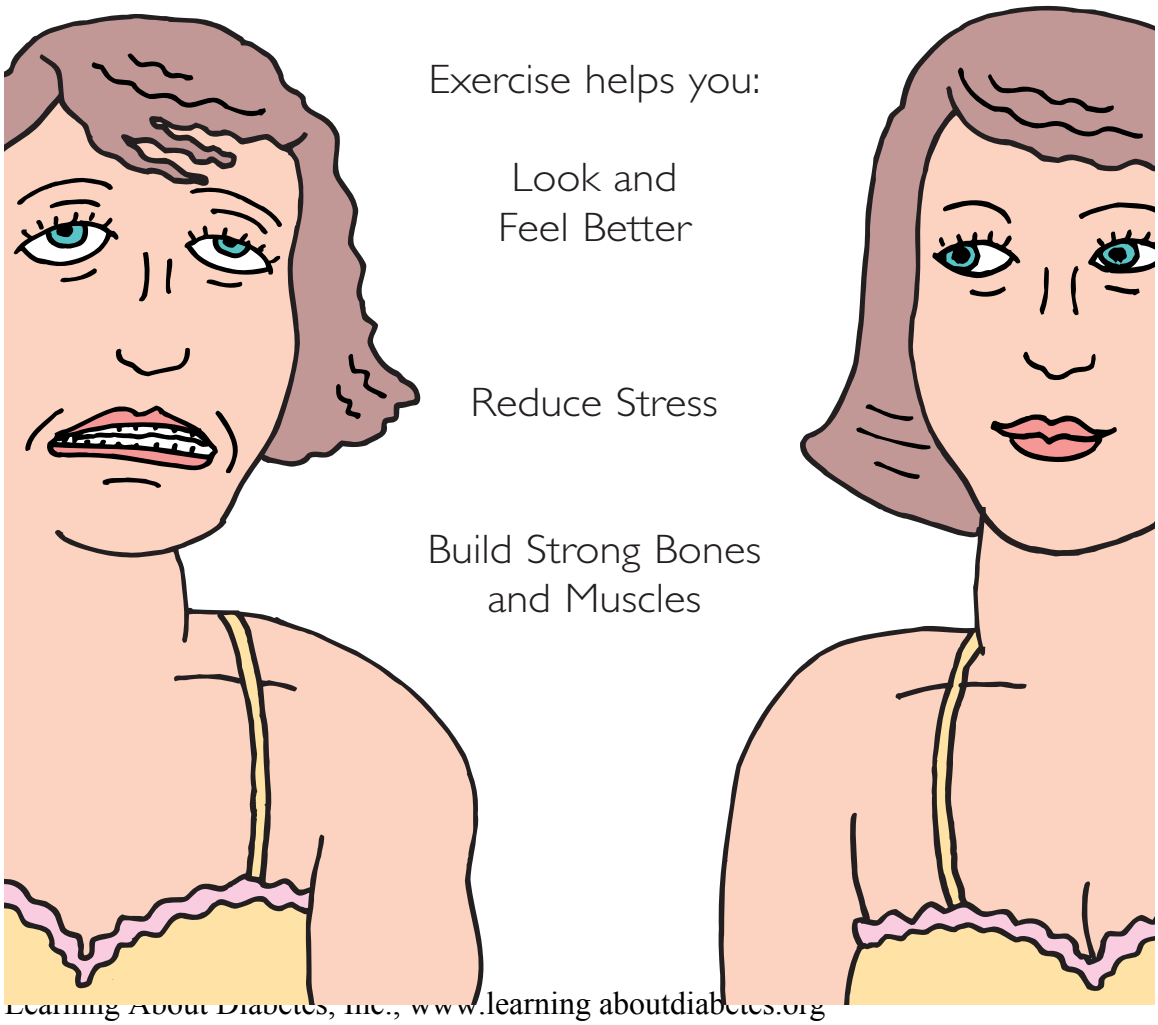
☐ lower blood sugar levels



☐ prevent heart disease

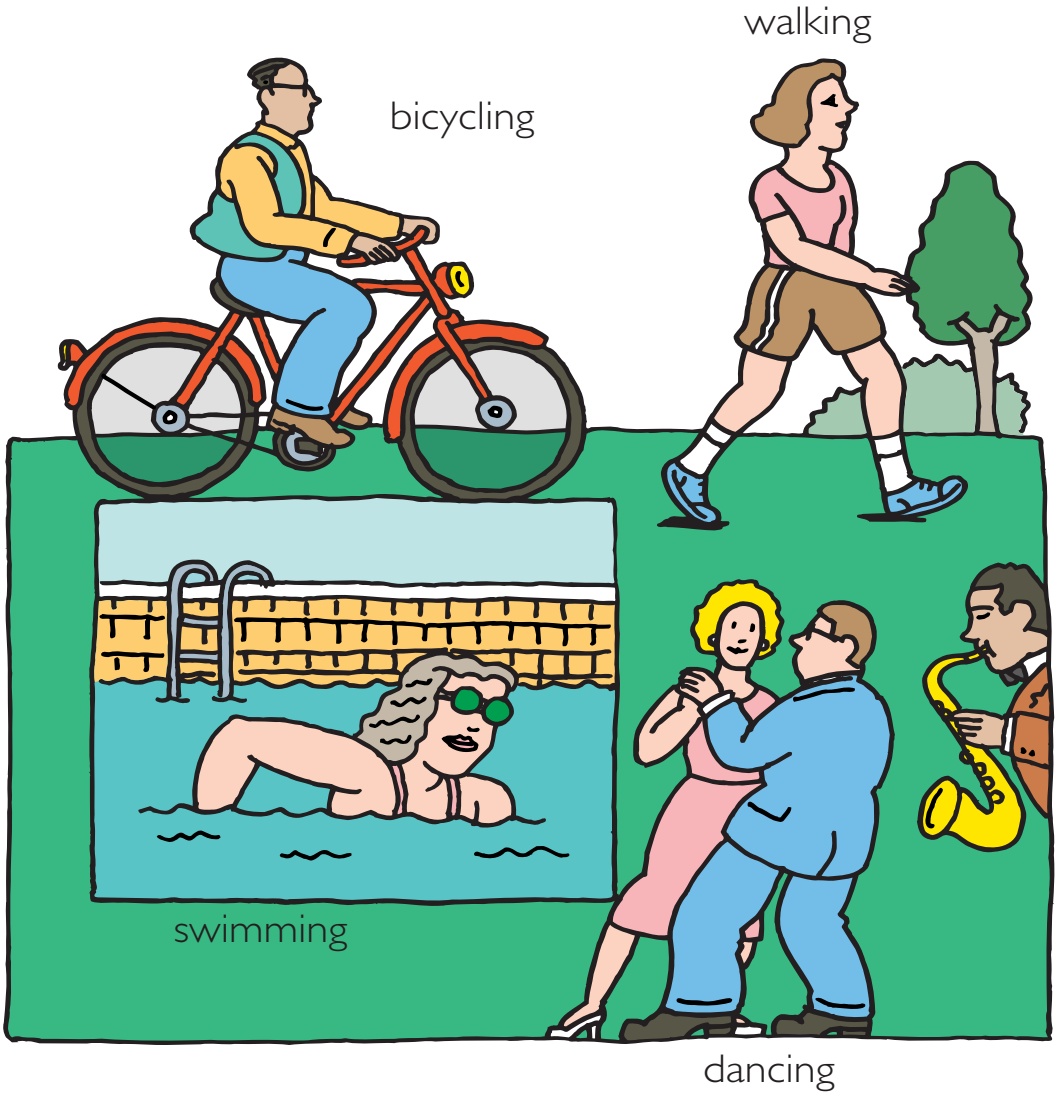


Exercise can also help control blood pressure and lower fat levels in your blood.



Getting Started

Find an exercise you like to do. You won't want to do it if it's not fun. Easy exercises to do include:

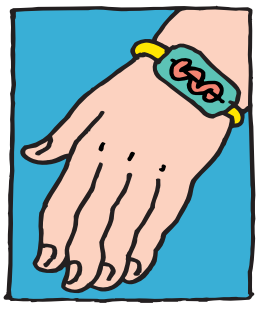


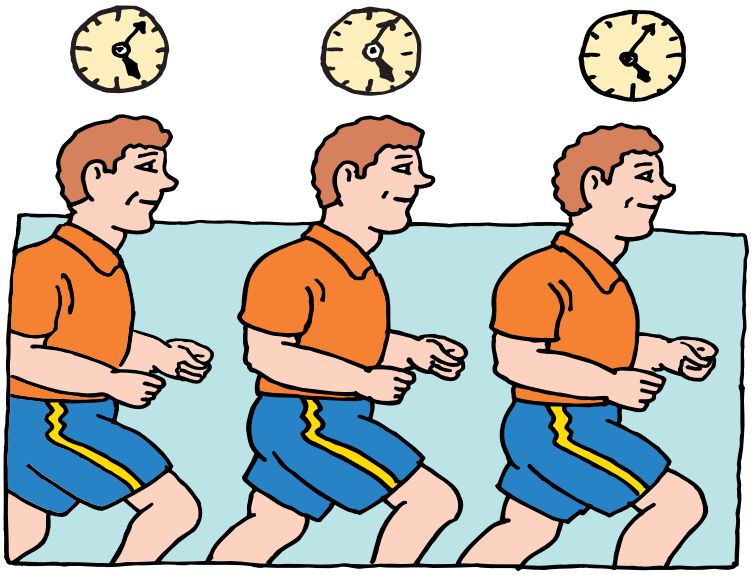
Find a friend
to help get you
going. It's fun
to do things with
someone else.

Get your family
involved, too.
Exercise is good
for everyone!

Always talk to your doctor
before you start to exercise.
You need to choose an
exercise program that
is right for you.

Wear your medical ID.
In an emergency,
someone will know
you have diabetes.

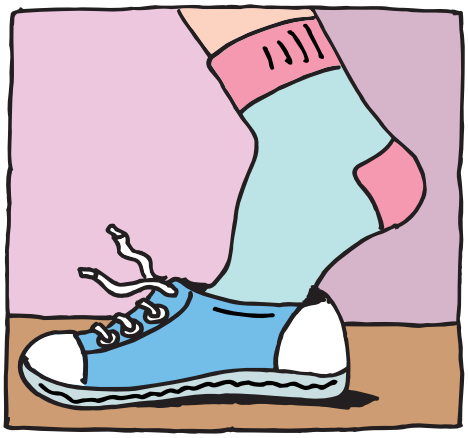




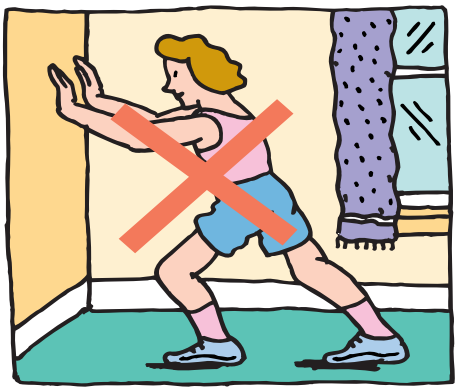
Try to exercise every day for at least 30 minutes. Exercise at the same time of day, if you can. If time is a problem, even 10 minutes of exercise 2 or 3 times a day can be good for you.

Safety First

Wear shoes that fit. Thick socks can help prevent blisters.



Start to exercise slowly. Slow walking or slow running may be helpful before and after exercise. Health experts no longer suggest people stretch before or after being active.



Drink plenty of water before, during, and after exercise.

People on insulin should discusswhen to exercise after a meal with their doctor.

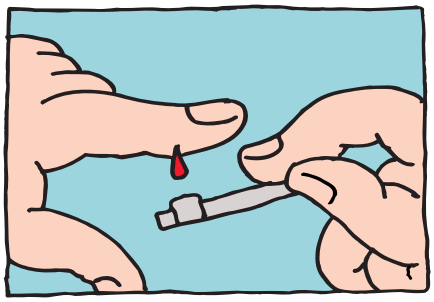
Stop exercising if you feel faint, have pain, or are short of breath.

Talk to your doctor about these problems before you exercise again.

Blood Sugar and Exercise

People with diabetes who take insulin or pills to lower blood sugar can have low blood sugar when exercising.

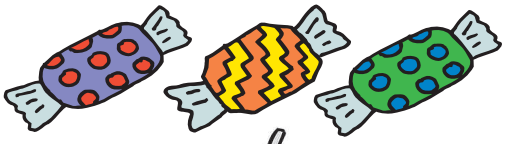
If you take insulin or a pill, you should:



- ☐ test your blood sugar before you exercise
- ☐ eat a fast-acting sugar snack if your blood sugar is less than 100
- ☐ eat a snack if you are exercising for more than 45 minutes

Examples of fast-acting sugar snacks include:

3 hard candies you can eat quickly or 2 packets of regular sugar

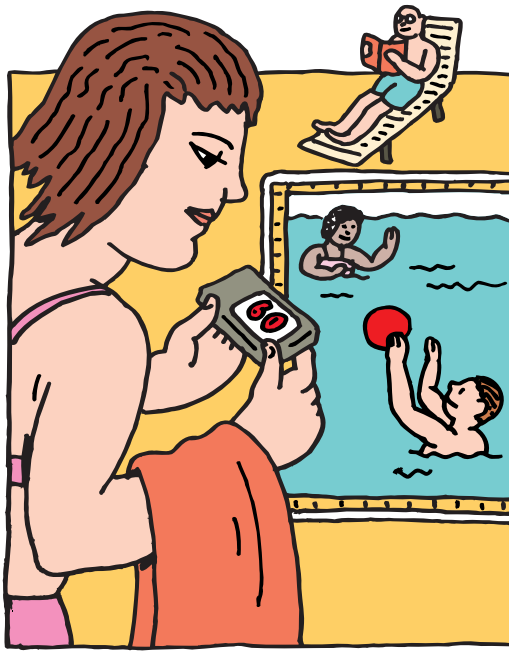


3 glucose tablets or 15 grams of gel

1/2 can of regular (not diet!) soda

Test your blood sugar right away if you feel signs of low blood sugar. If you can't test, treat anyway to be safe.

You can even have a low blood sugar hours after you exercise. Test your blood sugar often – before, during, and after exercise.



If you take insulin, don't inject it into the same body area you will use when you exercise. For example, don't put it in your leg if you are going jogging. It may work too fast.

Ask your doctor or nurse if you have any questions about your exercise program. They are there to help!

Always talk to your doctor before making any changes in your diabetes treatment plan.

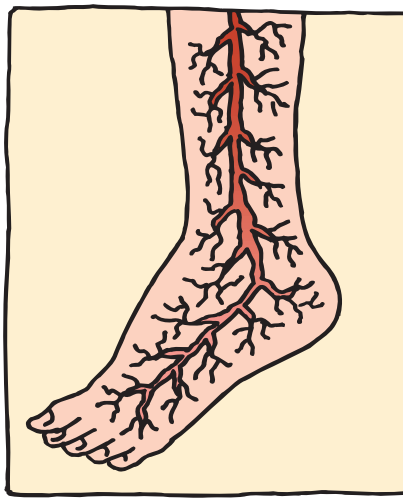
Visit www.learningaboutdiabetes.org for more free diabetes patient education programs.

 TA0906

DIABETES AND YOUR FEET

Learning About Diabetes, Inc., www.learning aboutdiabetes.org

When you have diabetes, it is important to take care of your feet. High blood sugar can damage the nerves in your feet and cause blood flow problems.



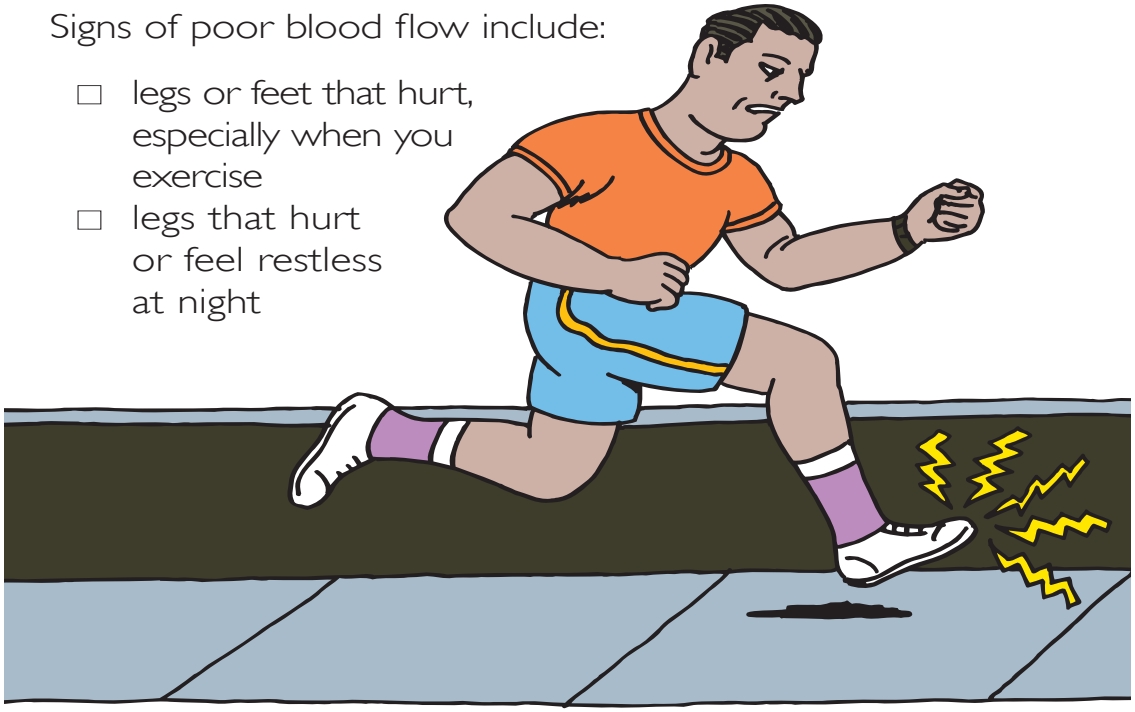
Nerve damage in your feet and legs can make your feet feel like they have "pins and needles" in them.

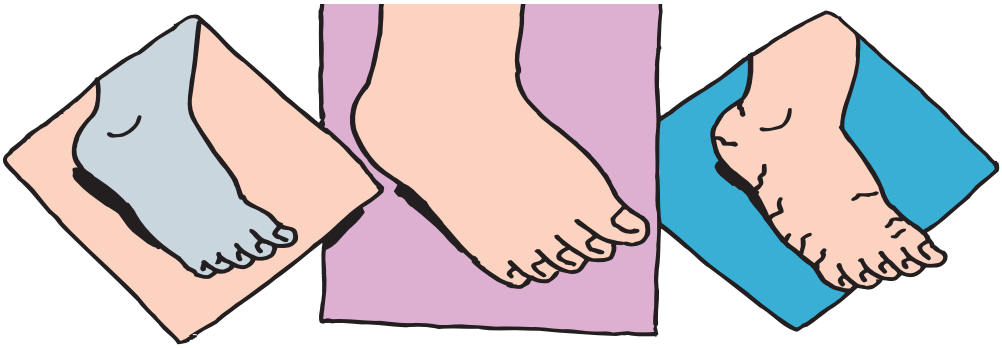
You may also lose feeling in your feet and not be able to feel pain, pressure, heat or cold. Then if you have a sore, blister, or injury, you may not know it right away. The sore can become infected.

Infection and poor blood flow can lead to losing your toes, foot, or leg.

Signs of poor blood flow include:

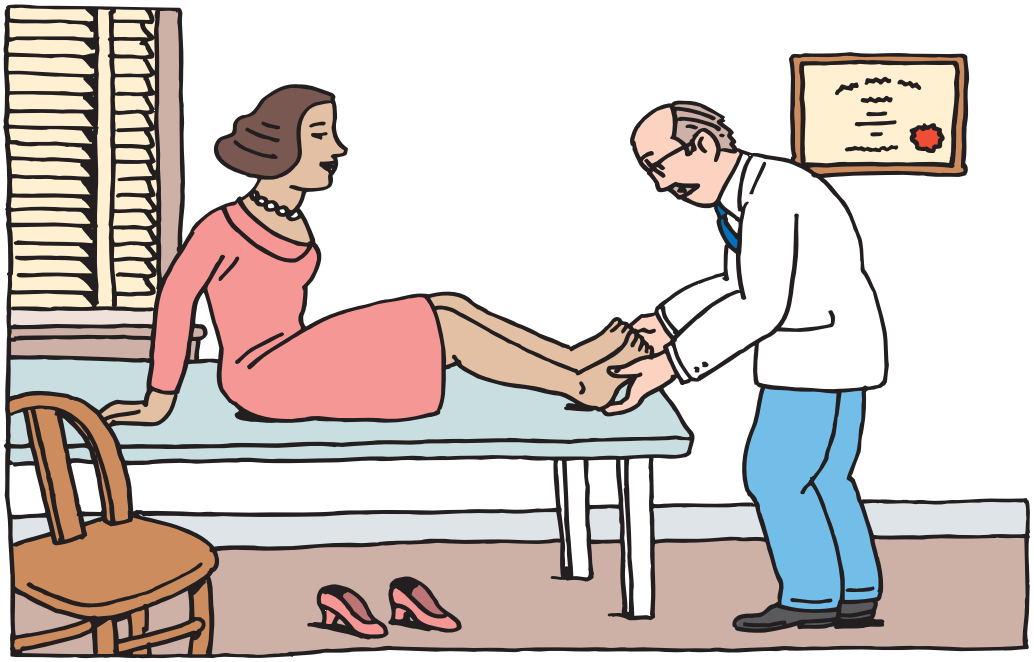
- ☐ legs or feet that hurt, especially when you exercise
- ☐ legs that hurt or feel restless at night





You may also have sores that won't heal, feet that are swollen or blue, or skin on your feet that is very dry and cracked.

If you have diabetes, it is important to have your feet checked often by your doctor or health clinic. Each time you visit your doctor or health clinic, make sure you take your shoes and socks off to have your feet checked.



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Tips for good foot care

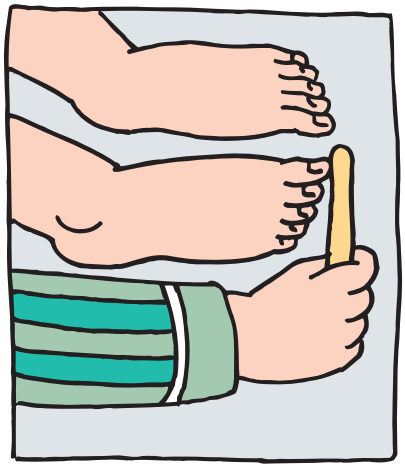
Check your feet every day for cracks, blisters, cuts, or dry skin between your toes or on the bottom of your feet. Use a mirror or get someone to help if you have trouble seeing your feet. Call your doctor right away if you see a sore on your foot. Don't wait.

Wash your feet every day with mild soap and warm (not hot) water. Always test the water first against your wrist or elbow to make sure it is not too hot. Dry your feet well, including between your toes.

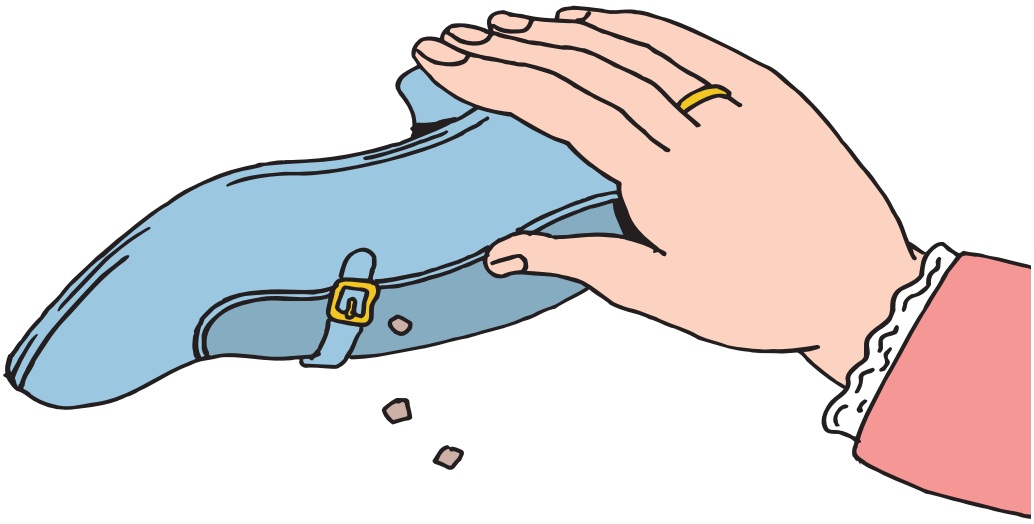
Don't soak your feet. It may dry your skin too much.

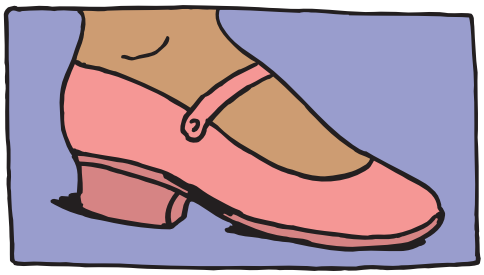
Use lotion or cream on the tops and bottoms of your feet (not between toes) and especially on any dry skin areas.

Trim your toenails straight across with an emery board or file. Do not use scissors or clippers.



Look inside and shake out your shoes and socks before you put them on. This will help you remove small objects that could hurt your feet.





Wear shoes that fit well, are comfortable, and don't cause blisters. Shoes that fully cover and protect your feet should be worn year-round.

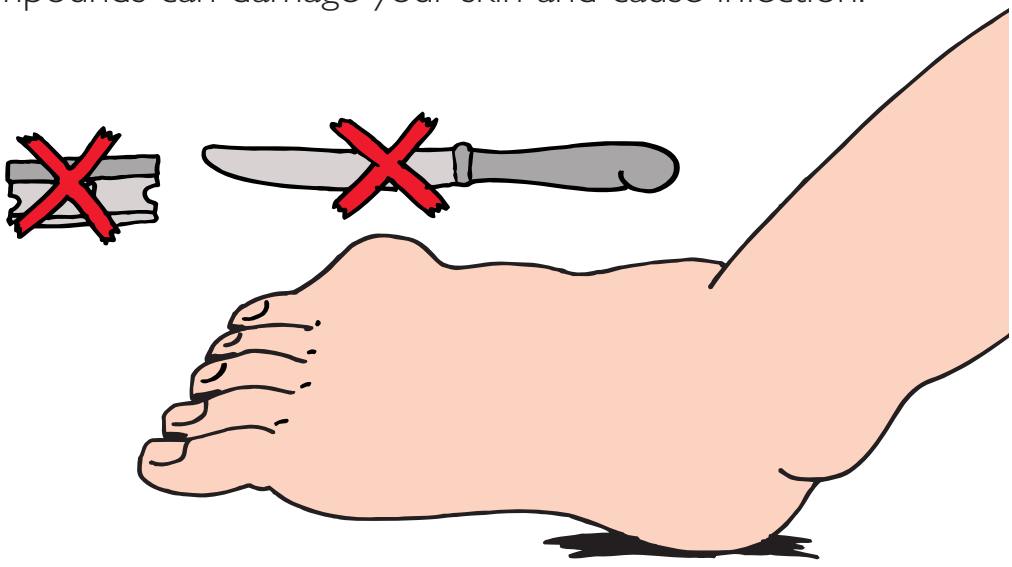
Never go barefoot, even indoors.

6

Cotton or wool socks will help keep your feet dry. If your feet are cold, wear warmer socks.

Don't use heating pads or hot water bottles to warm your feet.

See your doctor for care of corns, calluses, and warts. Never cut or treat corns and calluses yourself. Razor blades, corn plasters, liquid callus removers, and wart compounds can damage your skin and cause infection.



Appendix H: Written Permission to use Diabetes Knowledge Test

From: Campbell, Pam [pamcamp@med.umich.edu]
Sent: Wednesday, November 5, 2014
To: Bradshaw, Rondalyn
Subject: Re: Diabetes Knowledge Test

Hello Rondalyn,

Please feel free to use our survey instrument. We ask that you cite our center as follows: the project described was supported by Grant Number P30DK092926 (MCDTR) from the National Institute of Diabetes and Digestive and Kidney Diseases.

Should you have any additional questions, please let me know.

Thanks,

Pam Campbell
Michigan Diabetes research Center
Michigan Center for Diabetes Translational Research
University of Michigan Medical School
1000 Wall Street, RM# 6100
Brehm Tower
Ann Arbor, Michigan 48105
(734) 763-5730
(734) 647-2307 (fax)

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On November 3, 2014 at 6:52 PM, Dennis-Bradshaw, Rondalyn wrote:

Linda Potter
Michigan Diabetes Resource Center
University of Michigan Medical School

Dear Ms. Potter,

I am a doctoral student at Walden University and I am going to conduct a translation and evaluation on the effectiveness of diabetes self-management education program. I have discovered the Diabetes Knowledge Test instrument on the MDRTC website and note that the survey instrument is available for use once I acknowledge the MDRTC as the source of the items in the instrument in my study or publication resulting from their use. I will not modify the instrument. I would like to have verification that I can use the instrument with permission to utilize the DKT in my study. I will acknowledge the MDRTC as the source of the survey items in the instrument. Please let me know if you

require any other information that would assist in acquiring permission to use this instrument.

Sincerely,

Rondalyn Dennis-Bradshaw
Walden University
School of Health Sciences
Doctor of Nursing Practice (DNP) Program

Appendix I: Written Permission to Use Diabetes Education Materials

From: aboutdiabetes@aol.com [aboutdiabetes@aol.com]
Sent: Monday, September 8, 2014
To: Bradshaw, Rondalyn
Subject: Re: Diabetes Knowledge Test

Hello,

You are welcome to download and use our pdf files, as is, for your project. If you do, we request you add a footnoted copyright credit line as follows: *© Learning About Diabetes, Inc., www.learningaboutdiabetes.org … at the bottom of any page our work appears on.

For copyright and liability reasons, we cannot provide files that can be opened or manipulated in any way.

Best of luck with your project.

Paul

Learning About Diabetes, Inc.
www.learningaboutdiabetes.org
(520) 561-7100
Thanks,

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On September 7, 2014 at 4:05 PM, Dennis-Bradshaw, Rondalyn wrote:

To Whom It May Concern,

My name is Rondalyn Dennis-Bradshaw a Doctor of Nursing Practice student at Walden University. I am currently engaged in preparing a research project proposal in fulfillment of my degree.

I am going to conduct a study on diabetes self-management education between December 2015 and January 2015 and would like permission to use your learning materials or booklets on these topics: exercise and diabetes, diabetes and healthy eating, diabetes and your feet, understanding blood sugar and what is diabetes.

The project is solely for academic purposes and not for profit. I would appreciate your kind assistance.

Yours Sincerely,

Rondalyn Dennis-Bradshaw
Walden University
School of Health Sciences
Doctor of Nursing Practice (DNP) Program