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Are Type 2 Diabetes Patients Receiving Diabetes Self-Management Education in the Primary Care Setting?

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Erica Mahone, Student

Dr. Sharon Lock, Advisor

ARE TYPE 2 DIABETES PATIENTS RECEIVING DIABETES SELF-

MANAGEMENT EDUCATION IN THE PRIMARY CARE SETTING?

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University of Kentucky

College of Nursing

Spring 2015

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Dedication

I would like to dedicate this project to God for the strength He gave me to endure, and my family and friends for their encouragement, love and support throughout my time in the DNP program. I also would like to dedicate this project to Carvel, JahQuai, and Zyrann. I hope you all see that the sky is truly the limit. With God, love, hard work and dedication you can conquer anything you put your mind to.

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I would like to acknowledge Dr. Sharon Lock who served as my capstone committee chair, and my faculty advisor throughout the course of my doctoral studies. Her dedication, expertise, and mentorship will be forever appreciated. I would also like to thank Dr. Lynne Jensen and Ms. Rebecca Cole for being kind enough to take time out of their clinical and academic schedules to offer their time and expertise to assist me with completing this report. Finally, I would like to acknowledge all of my family and friends who provided me with encouragement and emotional support throughout my capstone process.

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Practice Inquiry Project Introduction

Erica N. Mahone

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Introduction

The American Diabetes Association (ADA) reported a prevalence rate of 9.3% for Diabetes Mellitus in 2012. Diabetes is a growing concern, with a reported 1.7 million new cases per year (2012). Complications of uncontrolled diabetes include episodes of hyper/hypoglycemia, heart attacks, strokes, kidney failure, blindness, lower limb amputations, and death (ADA, 2012). Guideline recommendations focusing to achieve target glycemic control include therapeutic lifestyle changes. These changes can be achieved through the participation of medical nutritional therapy, 150 minutes of physical activity per week, and the use of pharmacologic agents (AACE/ACE, 2015). Diabetes self-management education (DSME) programs aim to teach patients about their disease and management options, and to modify lifestyle behaviors. DSME serves to empower patients with diabetes to care for themselves. While these recommendations are for all persons with diabetes to attend DSME, it has been reported that only 56.8% have attended a form of formal DSME (ODPHP, 2015).

Diabetes requires a great deal of day to day self-care from the patient (Shirvastava et al., 2013). The American Diabetes Association's Standards of Diabetes Medical Care recommends that all persons with an A1c of 5.7-6.4% should be enrolled in an ongoing support program that targets weight loss and increasing physical activity. It also recommends that those with a diagnosis of diabetes should participate Diabetes Self-Management Education programs to provide ongoing education and support to assist these patients to achieve their specified treatment goals (2014). One of the Healthy People 2020 goals addressing diabetes focuses on the need to increase the number of patients who are receiving DSME to 62.5% from 56.8% (ODPDP, 2015).

This capstone report presents three manuscripts focusing on whether patients with diabetes are receiving DSME or being referred for DSME from another source. The first manuscript presents options of presenting DSME and its benefits. The second manuscript presents a review of the American Diabetes Association's Standards of Medical Care in Diabetes guideline for the recommendation of management. The findings of the review of literature led to a quality improvement project to investigate the demographic and clinical characteristics of patients with type 2 diabetes who are receiving referrals to participate in DSME, and to identify perceived barriers and facilitators of primary care providers providing DSME in the clinical setting. The final manuscript provides the details of this quality improvement project and provides recommendations to increase the number of patients who are receiving DSME.

Abstract

Diabetes is a growing health concern in the United States, with approximately 1.7 million new cases diagnosed yearly. A management option to help patients gain glycemic control is the participation in diabetes self-management education (DSME). DSME aims to teach patients how and why they need to perform self-care, and not solely rely on medications to manage diabetes. A literature review of 10 studies between 2007 and 2014 was conducted and found favorable health outcomes for participants of DSME. Patients who participated in DSME had improved glycemic control, achieved blood pressure and cholesterol goals, and lost weight. An analysis of the American Diabetes Association's Standards of Medical Care in Diabetes (2014) was carried out and also found that DSME is an integral component of the prescribed management plan. It should be presented to patients at the time of diagnosis and participation should be an ongoing expectancy of the patient. DSME is an underutilized diabetes management tool. A retrospective chart review found that primary care providers use the A1c level to determine if patients should be referred for DSME, this practice does not follow the guideline recommendations. This data led to conclude primary care providers should utilize diabetes educators and/or DSME community resources to develop specific, patient centered management plans to improve health outcomes of persons with diabetes.

DIABETES SELF MANAGEMENT EDUCATION: A Literature Review

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UNIVERSITY OF KENTUCKY

Introduction

Diabetes self-management education (DSME) aims to provide individuals with diabetes the necessary knowledge and skill needed to bring about positive lifestyle changes to successfully manage the disease and its related conditions. This is accomplished through collaboration with the patient and other healthcare professionals not limited to primary care providers, diabetes educators, nurses, nutritionists, endocrinologists, etc. DSME is an ongoing process that must incorporate the needs, goals and life experiences of the patient to empower them to achieve the goal of educating the patient to improve their ability to make informed decisions and perform self-care behaviors to maintain quality of life. There are seven components of DSME: healthy eating, being active, monitoring, taking medication, problem solving, healthy coping, and reducing risks (American Association of Diabetes Educators, 2010).

The purpose of this literature review is to investigate the role of diabetes self-management education (DSME) in persons with diabetes and how self-management of diabetes can improve health outcomes.

Background

Type 2 Diabetes Mellitus is a chronic medical condition, that when uncontrolled may lead to complications including diabetic ketoacidosis, blindness, renal failure, neuropathy, and peripheral circulation insufficiency. Peripheral circulation insufficiency may lead to non-traumatic lower limb amputations, and is the number one cause for non-traumatic lower limb amputations (Kentucky Diabetes Report [KDR], 2013). People diagnosed with diabetes are also more likely to acquire additional chronic conditions such as hypertension and hyperlipidemia. Diabetes, combined with hypertension and/or

hyperlipidemia, increases the risk of developing cardiovascular disease and morbidities related to uncontrolled glucose levels (KDR, 2013). Complications of diabetes include renal disease and neuropathic pains, and are due to poorly controlled glucose. These complications are non-reversible, even with improved blood glucose control (Shelby, 2012).

The American Association of Diabetes Educators has identified seven self-care behaviors for effective self-care management to prevent complications from uncontrolled diabetes. These behaviors include healthy eating, active lifestyle, glucose monitoring, medication adherence, problem solving, healthy coping skills, and risk reduction (American Association of Diabetes Educators [AADE], 2013). These self-care behaviors are essential to prevent morbidity and slowing the progression of diabetes complications. DSME should be individualized for each patient to ensure patient's ability to perform adequate self-care (AADE, 2013). Diabetes complications are four times more likely to develop in patients who do not receive DSME and training. In addition, individuals who receive diabetes self-management education and training are more likely to receive professional foot examinations, annual dilated eye exams, recommended immunizations, and hemoglobin A1C lab tests (AADE, 2013). Individuals with a diagnosis of diabetes are able to build self-efficacy by being empowered through diabetes self-management education (Purcell & Cutchen, 2013).Optimal diabetes management requires patient empowerment which may be acquired through self-management education and collaboration of multidisciplinary team, often led by a primary care provider (AADE, 2013).

Diabetes education is an intervention aimed to combat uncontrolled diabetes by teaching patients ways to better care for themselves, and is a primary tool that should be utilized in the management of those with diabetes. DSME can be provided in one-on-one sessions, group sessions, and telemedicine if necessary (AADE, 2007). During the educational sessions, patients will participate in various services such as diabetes self-management education, medical nutrition therapy, medical management, disease management, counseling services, and case management. Diabetes educators utilize situational problem solving, cognitive reframing, relapse prevention training and stimulus control to encourage behavioral changes (AADE, 2007).

Methods

This literature review was conducted using the PubMed, CINHL, and EBSCO Host databases. The keyword for the search were "diabetes education," "diabetes self-management education," "diabetes self-care," and "diabetes self-management." This search was limited to human subjects and reports in the English language.

Literature Review

Research supported the use of diabetes self-management education to improve patient knowledge and outcomes. Cene et al. (2013) used a quasi-experimental design to evaluate the Power to Prevent Diabetes Educational Curriculum across three North Carolina communities. Study investigators provided lifestyle modification education in twelve 60-90 minute group sessions to participants, both with and without a diagnosis of diabetes. A total of 104 African Americans participates in the study, with 43% completing 75% of the sessions. Results of the study showed an increase of knowledge of

healthy eating and physical activity, but there was not a significant change in participants' blood glucose, blood pressure, or weight (Cene et al., 2013).

A cross-sectional, observational study was conducted by Schafer et al (2013) to explore self-reported reasons for not participating in DSME. This study included 165 DSME participants and 132 DSME non-participants through the utilization of postal surveys and medical chart reviews. The results revealed that 95% of participants were recommended by their physician to attend diabetes education, while only 36% of nonparticipants received a recommendation to attend DSME. Findings revealed physician recommendation had an influence on whether or not patients attended diabetes self-management education programs. This research demonstrated the necessity of physician recommendation for their patients participate in DSME and should also assess patients' perception of diabetes knowledge and management to determine how patients can benefit from DSME.

Kazawa & Moriyama (2013) conducted a pre and posttest design study in Japan which included 30 people with type 2 diabetes, who also had a complication of peripheral nephropathy. A six month diabetes self-management skills-acquisition program was implemented with the goal of increasing self-efficacy to improve self-management skills related to diabetes care to prevent the initiation of dialysis. Short-term goals, such as setting a desired number of times glucose monitoring was done, exercising, and diet adherence, were set with the patients. The nurses then conducted telephone or face-to-face interviews to evaluate participants' goal attainment. Positive reinforcement was given to participants if their goals were met, and nurses would evaluate the achievability of unmet goals rather than blaming the patient. Patients were found to have improved

Hgb A1c levels, self-efficacy, and self-management abilities. All participants maintained renal function and did not have to initiate renal dialysis.

Welch et al. (2011) conducted a randomized control trial with 234 participants with diabetes to assess if motivational interviewing improved glycemic control. Motivational interviewing was offered to a group of participants in addition to receiving DSME. The results found that diabetes self-management education helps to improve glucose control, and had weak evidence to suggest patients receiving diabetes self-management education need additional motivation to make life style changes. This randomized controlled trial had 234 participants in the study. The participants receiving motivational interviewing had mean Hgb A1c changes that were significantly less (less improved) t = 2.10 and p=0.037, compared to participants who did not receives motivational interviewing.

Research that used web-based interactive registries within the clinic and provided providers with immediate feedback (i.e. point of care reminders and out of range clinical indicators) was found to have favorable outcomes in support of diabetes self-management education reference. Morrow et al. (2013) conducted a prospective cohort study in seven primary care offices that utilized an electronic diabetes registry to improve treatment guideline adherence and patient health outcomes. The electronic registry provided interactive education modules for patients to use to improve self-care management. The use of the registries found that patients were 1.4 times more likely to have an HgbA1c <9%; 1.8 times more likely to have an LDL < 100 mg/dL and 1.3 times more likely to have a blood pressure <140/90 mmHg. All variables were statistically significantly with p < 0.001 for HgbA1c, LDL and blood pressure.

Kim (2007) evaluated the use of technology to improve patients' self-management and health outcomes. Nurses used cellular short message services as an intervention to decrease Hgb A1c levels. A 12 week pretest-posttest design was conducted with 51 participants. The goal was to decrease or maintain A1c levels. Nurses delivered messages via phone that contained patient education and diet, exercise, and medication changes reinforcement on a weekly basis. Participants in the intervention group with an A1c <7% maintained glycemic control. Those with an A1c ≥ 7% had a mean percentage change of -2.15%. Participants in the control group had a mean change of -0.22%.

Research also is focused on weight management and diabetes self-management. Farrer & Golley conducted a non-randomized study to investigate the efficacy of traditional diabetes and weight management compared to a very low calorie diet in conjunction with traditional group education in type 2 diabetes patients. There were 26 participants who attended a 12 week dietary intervention for patients with type 2 diabetes. The control group received traditional dietary advice, and the intervention group received very low calorie diet plans. Weight loss was measured as a percentage, and the Hgb A1c and total cholesterol were also evaluated. The study showed that the very low calorie diet plan resulted in significant weight loss of 5-10% (p=0.004), and a decreased in A1c of 2.3% (p = 0.017). Weight loss in patients with diabetes helps to gain glycemic control and improve health outcomes.

A randomized controlled trial conducted by McGowan (2011) compared outcomes of participants (n = 321) who were referred and placed in a community based diabetes self-management education program to participants who received traditional

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diabetes patient education in a group format. The community based program offered traditional diabetes education and self-management skills. Both groups received the diabetes patient education from a certified diabetes nurse educator over a two day period; the intervention group also received weekly diabetes self-management education in small groups for six weeks. Outcome measures, A1c, HDL, LDL, and self-reported weight, were evaluated prior to the program and six months after program completion. Both groups were found to have significantly reduced weight loss and A1c ($p<0.0125$) at six months. The intervention group also had larger changes in self-rated health, communication with providers, along with greater reductions in weight loss and A1c.

Gagliardino, et al. (2013) sought to determine if diabetes self-management education received by health care providers resulted in different metabolic outcomes if provided by peers who have diabetes and received training to deliver DSME. Persons with type 2 diabetes participated in a four week diabetes education course either from providers or peers. Data were collected at the beginning of the program, 6 months and 12 months post education program. There was also a peer satisfaction survey at the end of the follow up period. The control group and intervention had similar positive outcomes in regards to clinical and metabolic indicators, but the intervention group achieved lower A1c levels and systolic blood pressure. The intervention group also showed higher adherence to physical activity and self-management over the year following the program.

Research aimed at determining if provider support attributes can influence patient motivation to self-manage their type 2 diabetes was conducted by Oftedal et al. (2010). An exploratory study and focus group involved 19 participants. Qualitative content analysis revealed perceived attributes of support from practitioners were 1.) empathetic

approach, 2.) practical advice and information, 3.) practitioner involvement in decision making, 4.) individualized accurate information, and 5.) ongoing group-based support. This study suggests that practitioners should practice the aforementioned attributes to increase self-management motivation in type 2 diabetic patients.

The importance and benefits of diabetes education begins with the provider ensuring the patient is educated on the disease, its management, and the benefits of lifestyle changes through DSME. Studies by Schafer, et al. (2013) and Oftedal, et al. (2010) suggest that patients need to be encouraged by their primary care providers to attend DSME due to their trust and confidence of the provider to care for their medical condition. The results from Oftedal et al. study showed that health care providers should be the central agent of diabetes management, while utilizing a multidisciplinary approach. Patient diabetes education should be encouraged early in diagnosis to improve patient understanding of the disease and necessary self-management (2010). Schafer et al, found through surveys that many diabetic patients feel they have adequate knowledge to care for their diabetes and do not attend additional diabetes patient education solely because the provider does not recommend for them to attend (2013).

The implementation of diabetes education has also been found to improve glucose control, blood pressure and kidney function. Maintaining these parameters can decrease the incidence of negative outcomes, such as cardiovascular disease (Shelby, 2012). Studies such as Cene et al., Kazawa & Moriyama, & Kim imply that diabetes education increases knowledge and understanding of the disease and its progression (2013; 2013; & 2007). This increase of patient knowledge encourages improved medication adherence and positive lifestyle changes leading to improved health

outcomes. Complications of diabetes often occur without the patient having physical symptoms. They may not always aware their blood sugars are low or elevated unless their blood sugar is extremely low or high. It is important for the patient to understand the disease, its process and both the positive and negative health consequences regarding its management. Effective patient education may yield patient understanding, which must be delivered to the patient either by the provider or at the suggestion of the provider by another qualified individual. A randomized control trial by Gagliardina et al. (2013) suggests that diabetes education can also be provided by clinicians, as well as trained patients with diabetes, with positive outcomes. Patients who completed diabetes education by either diabetes trained peers or healthcare professionals maintained decreased Hgb A1c levels, blood pressure, and adhered to physical activity participation up to one year following the study. Diabetes education assists patients to provide better self-care for themselves, increase self-efficacy, and maintain acceptable quality of life while living with diabetes.

Discussion

The initial diagnosis of diabetes may cause shock and confusion with the patient. The new requirements one must adhere to, such as carbohydrate counting, glucose monitoring, and dietary changes, may seem overwhelming to the patient and their families. Implementing necessary lifestyle changes and interventions prescribed by the healthcare providers may require assistance, which can be provided through diabetes education clinicians. Research aimed to examine how diabetes education combined with interactive reminders and self-reported patient data helps improve patient adherence. Using tools such as: on-line patient registries, text messaging (SMS), email reminders

and/or telephone call reminders, combined with frequent (bi-monthly) face to face

follow-up with a nurse or healthcare provider may help the patient with medication

adherence and to maintain lifestyle changes and medication adherence. According to

studies, diabetes education combined with interactive reminders resulted with patient

increased physical activity, improved blood pressure, and LDL cholesterol levels

(Gagliardina et al., 2013; Kazawa & Moriyama, 2013; Morrow et al., 2013). These

indicators remained improved six months post study completion. Maintaining blood

pressure and cholesterol levels at the recommended levels decreases the patients' risk of

developing microvascular and macrovascular diseases (ADA, 2014).

Providers should be encouraged to engage their patients with their disease

management, and on-line patient registries requiring patients to input data such as

glucose readings, physical activity, dietary logs, and physical activity. If providers are not

able to arrange an on-line registry, email and text messaging (SMS) reminders could be

used with patients. These actions may result in lifestyle changes, medication adherence,

increased patient accountability, and improved glucose control.

<center>Implications for Further Research</center>

The conclusions from the this literature review support the use of diabetes

education for self-management, but these studies are limited because there is only one

which utilized a randomized control trial method, but its sample could be have been

larger (Welch et al., 2010). Future research efforts should be directed at ways primary

care providers can compare patients' perception of their knowledge to their actual

knowledge level to determine the level of education they need to allow for appropriate

referrals to diabetes educators or an endocrinologist for further management. Further

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research should also focus on quantifying patient knowledge level changes pre and post diabetes education, in addition to how patients apply the information to their daily lives at the completion of DSME. Randomized control trials should be conducted in type 2 diabetics with the intervention group receiving diabetes education that focuses on teaching the disease process, lifestyle management and medication management to strengthen self-management skills and gain improved glucose control to decrease the incidence of negative health outcomes in these patients.

Conclusion

Diabetes education is an essential component for patients to effectively self-manage their disease and decrease the incidence of hyper- and hypoglycemic episodes, skin infections, eye disorders, heart attacks and strokes, and non-traumatic lower limb amputations (KDR, 2013). Effective management of diabetes greatly relies on the ability of the patient to properly perform self-care while at home, and should be individualized and follow the recommendations of the AADE (2013).

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Welch, G., Zagarins, S.E., Feinberg, R.G., & Garb, J.L. (2011). Motivational Interviewing Delivered by Diabetes Educators: Does it Improve Blood Glucose Control among Poorly Controlled Type 2 Diabetes Patients? *Diabetes Research and Clinical Practice,* 91, 54-60

Table 1. Literature Review Table

Authors, Year	Title, Journal, Reference info	Sample	Methods	Study Design	Findings
Cene, C.W., Haymore, L. B., Ellis, D., Whitaker, S., Henderson, S., Lin, F., Corbie-Smith, G. (2013)	Implementation of the Power to Prevent Diabetes Prevention Educational Curriculum Into Rural African American Communities *The Diabetes Educator,* 39, 776-785	104 African Americans across three North Carolina communities; 15 community health ambassadors	Community based participatory research, quasi-experiment	Pre and post-curriculum questionnaires, semi-structured interviews, and assessment of blood glucose, blood pressure, and weight	43% of participants completed the 6 month program. There was an increase from 64% to 80% in the diabetes knowledge questionnaire and the knowledge of the impact of healthy eating; self reports of physical activity increased and were maintained six months post study. Participants gained an increased understanding of disease process and its management.
Farrer, O. & Golley, R. (2014)	Feasibility Study for Efficacy of Group Weight Management Programmes Achieving Therapeutic Weight Loss in People with Type 2 Diabetes; *Nutrition & Dietetics,* 71, 16-21	N=26	Non-randomized control and intervention comparison	12 week weight loss program. The intervention group received very low calorie diets and weight management education. The control group received traditional diabetes education and weight management education. Study design aimed to have minimal researcher contact to simulate real life conditions. Outcome measures were	The intervention group had significant weight loss of 5-10%, with an average 6.6 kg loss. A significant decrease in A1c (p=0.017), but an insignificant change in total cholesterol. Weight management education can assist DM2 patients with initial weight loss and to maintain that weight loss. Weight loss in DM2 patients can help decrease the risk of morbidity and mortality related to DM2

				percentage weight loss, HgbA1c changes, and total cholesterol.	
Gagliardina, J. J., Arrechea, V., Assad, D., Gagliardina, G. G., Gonzalez, L., Lucerom S., Rizzuti, L., Zufriategui, Z., & Clark Jr., C. (2013)	Type 2 Diabetes Patients Educated by other Patients Perform at least as Well as Patients Trained by Professionals; *Diabetes Metabolism Research and Reviews,* 29, 152-160. DOI 10.1002/dmrr.2368	DM2 patients 25-75 years old, who were followed by a provider for at least 2 years and with two patient encounters; n=105 in control group and n=93 in intervention group	RTC peer education and continuing support (pt diabetes education group led by clinicians and pt diabetes education groups led by peers implementing education and support)	Subjects randomly assigned to control or intervention group. The intervention group also received cell phone calls and face to face bi-monthly interviews by RNs to help patients apply information to daily life. The control group received diabetes education from a diabetes referral center which provides education to patients and providers	Both groups had similar positive clinical, metabolic and psychological effects. The intervention group maintained lower A1c levels, systolic BP, and had increased adherence to physical activity a year following the study.
Kazawa, K. & Moriyama, M. (2013)	Effects of a Self-Management Skills-Acquisition Program on Pre-Dialysis Patients with Diabetic Nephropathy, *Nephrology Nursing Journal,* 40(20), 141-148.	N=30 DM2 patients with nephropathy in Japan (GFR 15-59, urinary albumin: creatinine ratio ≥ 300)	Pre-test and posttest design. Face to face and telephone interviews were conducted by nurses. The educational intervention taught patients disease knowledge and self-management techniques with the hope to avoid the initiation of dialysis. Positive feedback was used to praise goal achievements.	A comparison of Scr, GFR, and A1c at 6 months prior to the intervention; time of participant registration; three months post intervention and six months post intervention. Psychological, physiological, and process indicators were measured.	The intervention resulted in improved self-efficacy, self-management ability, and A1c results six months post the intervention. The participants maintained renal function without the need to begin renal dialysis. Developing close relationships with patients with chronic conditions and helping them identify their personal self-management habits that improve or worsen their health status help patients to make

				Nurses used the telephone or mail to collect self-management skills acquisition and collected laboratory results from medical records or supplied to nurses by participants.	positive lifestyle changes yielding positive health outcomes.
Kim, H. (2007)	Impact of Web-based Nurse's Education on Glycosylated Hemoglobin in Type 2 Diabetic Patients. *Journal of Clinical Nursing*, 16, 1361-1366	N=51 (26 controls and 25 intervention) The subjects were divided into the control and intervention groups based on the baseline A1c. Those with an A1c < 7% and those with an A1c ≥ 7%	Pretest-posttest measuring the nurses' education effectiveness	12 week continuous education which reinforced diet, exercise, medication adherence and self-monitoring of blood glucose levels. The intervention group received short messages on their cell phones or via internet reminding them to upload glucose level results, diet and exercise diaries daily to a specific website. The A1c, fasting glucose, and two hour glucose were measured before and after the intervention.	The control A1c < 7% had a significant decrease in A1c; the intervention group had an insignificant decrease in the A1c. The ≥ 7% A1c intervention group A1c significantly decreased, yet the control group had insignificant decrease of A1c. Short messaging services via cell phones and internet can help maintain an accepted A1c in controlled patients, and help to decrease the A1c levels in those with elevated A1c levels. The reminders may serve to help patients maintain lifestyle changes to better manage their diabetes.
McGowan, P. (2011)	The Efficacy of Diabetes Patient Education and Self-Management	Adult DM2 patients; groups randomized based on the last	Pretest-posttest with outcome measures taken at baseline and 6 months (A1c, HDL, LDL,	Control group received traditional diabetes patient education;	The pre/post comparison resulted in significantly improved A1c, weight, LDL, and HDL levels. The intervention

				intervention group received same education and participated in Stanford Chronic Disease Self-Management Program (problem solving skills, day to day decision making, finding and using resources, developing trusting relationships with healthcare team, and developing and implementing short term goal plans).	group had greater improved results compared to the control group. This study helps to encourages providers to refer patients/provide diabetes education as well as helping them to identify low cost community services to help patients adhere to lifestyle changes to improve health outcomes of diabetic patients.
Education in Type 2 Diabetes; *Canadian Journal of Diabetes,* 35(1), 46-53		three digits of medical records health number	& self-reported weights)		
Morrow, R. W., Fletcher, J., Kelly, K. F., Shea, L. A., Spence, M. M., Sullivan, J. N., Cerniglia, J. R., & Yang, Y. (2013)	Improving Diabetes Outcomes Using a Web-Based Registry and Interactive Education: A Multisite Collaborative Approach. *Journal of Continuing Education in the Health Professions,* 33(2), 136-145	Patients who had 2 or more practice visits in a 12 month period.	Prospective cohort analysis using random regression models to measure impact of registry use for each metric	New York Diabetes Coalition recruited 7 primary care practices to execute a patient registry. The practices received education on registry use, work flow and patient engagement. A1c, LDL, blood pressure measurements were assessed quarterly	An online registry and interactive education led to improved patient outcomes. Patients were 1.4 times likely to have an A1c ≤ 9%; 1.8 times likely to have an LDL < 100 mg/dL; and 1.3 times likely to have BP <140/90 when they utilized the registry.
Oftedal, B., Karlsen, B., & Bru, E, (2010)	Perceived Support from Healthcare Practitioners among Adults with Type 2 Diabetes, *Journal of*	19 adults with DM2	Descriptive/ explorative qualitative design	Three, two session focus groups with a semi structured interview guide. Using the	Healthcare practitioners may increase self-management care of diabetic patients if the practitioner's care is empathetic, individualized, and

	Adv Nursing 66(7), 1500-1509			expectancy value model of achievement motivation.	practical and should allow for continued group based support. Patients adapt positive self-care habits when they feel the provider cares for them.
Schafer, I., Kuver, C., Wiese, B., Pawels, M., van den Bussche, H., & Kaduszkiewicz, H. (2013)	Identifying Groups of Nonparticipants in Type 2 Diabetes Mellitus Education; *American Journal of Managed Care,* 19 (6), 499-506	165 participants and 132 nonparticipants in German cities	Cross-sectional observational study. Randomly selected into study.	This study compared participants in diabetes education groups with nonparticipants. A standardized postal patient survey and chart reviews were utilized to gain information for analysis. The patient survey consisted of the PHQ-2, the 7 item F-SOZU to assess perceived and anticipated social support, and the CASMIN standard to classify education. The nonparticipants were given a 12 item survey to identify reasons they did not participate in diabetes education	Participants of DSME received recommendations to attend diabetes education from their providers. Nonparticipants believed they had enough education or felt their PCP was responsible for their diabetes education. Physicians need to assess patient's perception of their knowledge of diabetes, and be more supportive of diabetes education to enhance patient participation.
Welch, G., Zagarins, S.E., Feinberg, R.G., & Garb, J.L. (2011)	Motivational Interviewing Delivered by Diabetes Educators: Does it Improve Blood Glucose Control Among Poorly Controlled Type	Poorly controlled (A1c ≥ 7.5%) DM2 patients (n=234); 4 certified diabetes educators	RTC	Patients were randomized into groups receiving diabetes education with motivational interviewing (with	Hgb A1c levels were statistically improved in the DSME group without MI, compared to the DSME with MI. A1c levels were increased overall in all participants by the application

				and without patient self-assessment tool), and traditional diabetes self-management education (with and without summary tool)	of DSME. Patients do not need additional motivation if they are provided with proper education to manage DM.
	2 Patients?				

An Analysis of the 2014 Standards of Medical Care in Diabetes Guideline

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Type 2 Diabetes Mellitus is a chronic medical condition that can progress to blindness, lower limb amputations, and renal impairment without effective management to prevent the long-term effects of the disease. Treatment for effective management of type 2 diabetes is complex and may require lifestyle changes and many medication adjustments to find the most appropriate regime to achieve glycemic control and decrease the risks associated with uncontrolled diabetes (Robertson, 2012). The purpose of this guideline analysis is to conduct a review the American Diabetes Association's Standards of Medical Care in Diabetes-2014 guideline.

Background

The American Diabetes Association estimated in 2012 that diabetes affects 29.1 million Americans, of which 8.1 million are undiagnosed persons, with a prevalence rate of 9.3%. The prevalence rate has increased from 25.8 million and 8.3% since 2010 (ADA, 2015). The United States has approximately 86 million people who are prediabetic, and diabetes ranks number seven in leading causes of deaths (ADA, 2015). Medical costs associated with direct medical care related to diabetes are reported at $176 billion, which is 2.3 times higher than individuals not diagnosed with diabetes (ADA, 2015).

According to the Kentucky Diabetes Report, prepared by the Kentucky Cabinet for Health and Families (KDR), the 2010 incidence rate of diabetes in Kentucky is 10% (370,000 people). The rate has increased from 3.5% since 1995. Kentucky has a higher incidence compared to the United States, which was 6.5% in 2010, and it is estimated that an additional 137,000 Kentuckians have undiagnosed diabetes (KDR, 2013). The rate of Kentucky Medicaid members with diabetes is 18%; this rate rises above 20% in the

Eastern Kentucky region. The diabetes epidemic in Kentucky is worse among those who have a yearly income of less than $15,000 (20%), compared with 6.6% of Kentuckians who have a yearly income of $50,000 or more. Kentuckians with a yearly income between $25,000-35,000 have a prevalence rate of 11% according to the Kentucky Diabetes Report (2013).

Hospital charges related to diabetes in Kentucky exceeded $183 million in 2011, and Emergency Department cost related to diabetes treatment exceeded $23 million (KDR, 2013). Hospital related charges due to inpatient admissions in Kentucky exceeded $350,000 in 2011. The primary disorder leading to treatment in the hospital was peripheral circulatory disorders due to diabetes, followed by diabetes associated renal manifestations (KDR, 2013). A report generated from commercial insurance claims by UnitedHealth Center for Health Reform & Modernization showed that diabetes claims were 7% of this population, with an annual cost of $11,700 compared to $4,400 of those without diabetes (KDR, 2013). According to the American Diabetes Association, the medical care of patients with diabetes who are hospitalized accounts for 50% of total diabetes care, and is the result of uncontrolled diabetes self-care (2014).

The purpose of the Standards of Medical Care in Diabetes is for the American Diabetes Association (ADA) to provide clinicians, patients, and any other interested persons with recommended diabetic care components, diabetic treatment goals, and quality of care evaluation tools (ADA, 2014). The guideline aims to define diabetic diagnostic criteria, risk factors, therapeutic lifestyle changes, and medication management to decrease the morbidity and mortality of individuals affected with the disease.

Stakeholder Involvement

The American Diabetes Association is the sole professional group responsible for the development of the Standards of Medical Care in Diabetes. The American Diabetes Association (ADA) is an organization made up of individuals with multidisciplinary medical and non-medical educational backgrounds. The ADA serves with the purpose of executing research to improve the management of diabetes, and with the hope of identifying a cure for diabetes. They also raise awareness about growing epidemic of diabetes and work to eliminate discrimination towards those diagnosed with diabetes (ADA, 2014).

An organization that was left out of the development of the Standards of Medical Care-2014 is the American Association of Clinical Endocrinologists (AACE). It appears that the AACE could have been a valuable contributor to the development of the ADA Standards of Medical Care in Diabetes 2014 because the members of the AACE have clinical backgrounds involving providing care to diabetics, and their expertise resides in endocrinology (AACE, 2014). The members of AACE also conduct and fund research efforts to improve medical outcomes for diabetics and to improve clinical management of the disease. This group could have offered a significant level of clinical expertise to assist with guideline recommendations to clinicians.

Rigor of Development

The ADA Professional Practice Committee (PPC) is charged with updating the Standards of Medical Care in Diabetes annually. The PPC is comprised of physicians, diabetes educators, registered dieticians, and experts in endocrinology, epidemiology, public health, lipid study, hypertension, and pregnancy care. Individuals are appointed to

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the committee based on clinical practice and/or research. The PPC included studies published after January 1, 2013 and utilized the Medline database to search for human studies that fell within the subsections of the guideline (ADA, 2014). The ADA developed an evidence grading system that was utilized to grade the reviewed evidence to develop recommendations. An "A, B, C, E" grading system was devised with a grade A being the highest level of evidence, and a grade E being the lowest level of evidence (2014).

Evidence was classified as grade A if the study was a well-conducted randomized clinical trial, with generalizable results, and adequate power. Types of evidence within this category include evidence from multi-center and single center trials, and meta-analysis results that included quality ratings. Grade A evidence included adequately powered generalizable randomized controlled studies, with studies coming from well-conducted multicenter trials, meta-analysis with quality ratings of compelling non-experimental evidence (i.e. "all or none rule" developed by at the University of Oxford). Grade B evidence included well conducted prospective or registry cohort and case control studies. Cohort study meta-analysis were also included with this category. Grade C evidence consisted of poorly or uncontrolled studies. Evidence with at least one major or three minor methodological flaws, high biased observational studies, and case series/reports were determined to be poorly or uncontrolled studies. Lastly, clinical expertise and expert consensus were graded level E (ADA, 2014).

The evidence found in the systematic review was reviewed, graded, and then used to revise recommendations, or clarify recommendations from the previous year. The PPC undergoes this process yearly. The recommendations the ADA presented in the guideline

were taken directly from the evidence of the systematic review. The guideline

recommendations also had the rationales provided within the guideline. The

recommendation changes are usually completed in October, and published in January.

Clarity and Presentation

The recommendations presented in the Diabetes Standards of Medical Care were

written very clearly and with the principles of health literacy in mind. The terms used in

the guideline are not written in medical jargon. The ADA made a statement that they are

interested in providing management recommendations to patients, clinicians, and anyone

else who is affected by diabetes. The guideline recommendations were specific and

unambiguous. An example of this includes the prevention and management of

cardiovascular disease. It stated that any person with diabetes who has a blood pressure

greater than 120/80 mmHg should be encouraged to participate in lifestyle changes to

reduce their blood pressure. Lifestyle modifications from the guideline include weight

loss, adhering to the DASH diet, limiting alcohol intake, and increasing the amount of

physical activity (ADA, 2014).

Another example of the specificity and unambiguity of the guideline include the

pharmacological therapy recommendations for hyperglycemia management in Type 2

diabetes. The initial therapy stated to begin with Metformin, unless contraindicated. Once

Metformin has been titrated to the maximum dose and the A1C has not reached its target,

a second oral agent should be added. The recommendation is to consider a glucagon like

peptide 1 (GLP-1) or insulin. While the ADA provided a recommended treatment

algorithm, the guideline also states the clinicians should use a patient centered approach.

A patient centered approach would include the consideration of cost, potential side

effects, hypoglycemia risks, and patient preference (ADA, 2014). The recommendations presented in this guideline were very clear to its readers.

The ADA provided recommendations for Type 1 and Type 2 diabetics, gestational diabetics, the pediatric population (Type 1, Type 2, and Monogenic), as well as the pediatric population with comorbid conditions such as hypothyroidism, celiac disease, preconception females, diabetic care during pregnancy, and diabetes in the older adult. Treatment recommendations for common complications associated with diabetes including depression, neuropathy, and chronic kidney disease, were also included in the guideline (ADA, 2014). The guideline specified medication management for Type 1 diabetics and involved multiple dose injections of insulin, or continuous subcutaneous insulin infusions. The multiple dose injections regime included three to four injections of prandial and basal insulin. The continuous subcutaneous insulin infusion is the use of an insulin pump. Pharmacological management for Type 2 diabetic patients began with Metformin, a biguanide, unless there is a contradiction, followed generally with the addition of a glucagon-like peptide 1 receptor agonist, or insulin. Insulin many be the initial line of therapy if the A1C and/or glucose are markedly elevated (ADA, 2014).

The pivotal recommendations of the Standards of Medical Care in Diabetes-2014 include recommendations to maintain blood pressure <140/80 mmHg. Blood pressure should be monitored at each visit. Lifestyle modifications should be initiated once a patient with diabetes has a blood pressure above 120/80 mmHg, including weight loss, increasing physical activity and dietary changes. ACE Inhibitors or ARBs are the antihypertensive drug classes of choice for diabetic patients, to protect renal function. Fasting lipid profiles should be measured at least annually, with a target LDL <100

mg/dL, and HDL > 50 mg/dL, and triglycerides <150 mg/dL. Statin therapy should be initiated when the LDL > 100 mg/dL for diabetic patients since this increases their risk for cardiovascular disease. If the patient has a high risk of developing cardiovascular disease, the guideline recommends for the patient to maintain a LDL level < 70 mg/dL (ADA, 2014). These key recommendations are easily identifiable. They are summarized in the Executive Summary of the guideline, as well as within the guideline itself. The section headings are bolded, and many of the treatment recommendations within a subheading are bulleted. It would be helpful if the guideline included a table of contents. There are three columns per page, and it is time consuming to read through the headings.

Application

The potential barrier of applying the recommendations is the focus of patient centered care that the guideline recommends. The patient should have input into their management plan. This may impede appropriate management with patients with Type 2 diabetes because of clinicians attempting to comply with patient wishes. Patients who do not want to initiate insulin therapy, but need it to regulate glucose levels, may attempt to bargain with the clinician and increase their risk of developing nonreversible complications due to uncontrolled glucose.

The financial implications of implementing the guideline recommendations are minimal. The ADA has a statement at the beginning of the guideline stating that many of the recommendations are cost effective. The GLP-1 receptor agonist are moderately priced, but prescriptions saving programs such as Wal-Mart $4 medication list offer Metformin and sulfonylureas for $4(walmart.com), and Meijer pharmacy offers free Metformin immediate release (Meijer.com). These programs allow for an alternative

medication management options for low income individuals. The guideline does not

specifically mention the prescription saving programs, but it does mention the importance

of considering patient preference and financial cost of prescribing care (ADA, 2014).

Editorial Independence

The guideline was developed by the members of the Professional Practice

Committee of the American Diabetes Association. The ADA does not have any outside

sponsorship that contributed to the guideline development. The members of the PPC were

required to disclose any form of conflicts of interest for a 12 month period prior to the

development of the guideline (ADA, 2014). The members were required to disclose place

of employment, receipt of research grant/support, ownership interests,

consultants/advisory board appointments, and any other type of potential conflict of

interest. The ADA offers a statement that the ADA is responsible for the funding of The

Standards of Medical Care in Diabetes and that it does not use industry support for the

development or revision of the clinical guideline (ADA, 2014).

Recommendations

The American Association of Clinical Endocrinologists developed the Medical

Guideline for Clinical Practice for Developing a Diabetes Mellitus Comprehensive Care

Plan (2011). The guideline uses the same diagnostic methods; fasting glucose > 126

mg/dL, glucose >200mg/dL after a 75 gram oral glucose load ingestion, manifestation of

symptoms of uncontrolled hyperglycemia, and an A1C level $\geq 6.5\%$ (AACE, p. 6, 2011).

The AACE has a stricter A1C level compared to the ADA, which defines diabetes with

an A1C above 7%. AACE also encourages tighter blood pressure control, with a goal <

130/80 mmHg. The ADA and AACE both have the same treatment goals for

hyperlipidemia, an LDL <100mg/dL, and < 70 mg/dL for high risk patients. Both

organizations also explain the benefits of implementing therapeutic lifestyle changes to

assist with management of diabetes. Lifestyle changes including dietary changes,

increasing physical activity, and weight loss for those who have a BMI > 29 (AACE,

2014).

In the clinical setting, either of these guidelines may be applied. The ADA

guidelines would be appropriate for diabetic patients who have a low 10 year

cardiovascular disease risk. The target parameters of critical measurements of diabetic

patients are the A1C and blood pressure. The medication therapy recommendations from

the AACE are similar to the pharmacology recommendations from the ADA. Both begin

with the initiation of Metformin, followed by increase in the dose of Metformin, then

adding up to two additional agents. Insulin therapy is recommended after triple agent

approach does not help the patient achieve a goal A1C level. The parameters of the ADA

guideline are less strict, so it is assumed to be fewer incidences of hypoglycemia. The

AACE guideline would be more suitable for high risk cardiovascular disease patients.

Stricter blood pressure control, lipid thresholds, and tighter glucose control decreases the

risks of the patient developing cardiac complications.

I would recommend the use of the Standards of Medical Care in Diabetes-2014

for other practitioners to utilize in their practice. The guideline is well organized, and

simple to follow. The recommendations of the guideline are evidence based, and fairly

easy to implement in the clinical setting. The recommendations do not appear to cause a

financial burden on patients.

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Are Type 2 Diabetic Patients Receiving Diabetes Self-Management Education in the

Primary Care Setting?

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Introduction

Diabetes self-management education (DSME) and is an ongoing educational process that teaches individuals with diabetes and those who will be involved in their care how to manage the disease. There are aspects of DSME which can be provided to persons with prediabetes to encourage lifestyle changes to prevent the advancement of the disease (AADE, 2015). Prediabetes is when the blood glucose levels are higher than normal, but not high enough to be diagnosed with diabetes. The A1c ranges from 5.4% to 6.4%, or a fasting glucose of 100 – 124 mg/dL (ADA, 2014b). The American Diabetes Association recommends that all individuals with prediabetes and type 2 diabetes receive DSME to prevent or delay the complications associated with uncontrolled glucose levels. (2012). DSME allows for providers to individualize the information to meet the patients' needs considering their ethnicity, sex, age and literacy level. The provider should also consider the patients' financial and social resources to ensure the patient will be able to take the learned skills to carryout adequate self-care techniques (ADA, 2012).

Group and individual DSME provides the recipients with information concerning the disease process, treatment options, proper glucose monitoring, healthy lifestyle options, disease complication management and individualized decision making strategies (CDC, 2014a). Private insurance companies reported that only 6.8% of newly diagnosed patients with diabetes participated DSME in 2011-12 (CDC, 2014a). The American Diabetes Association recommends that all persons with prediabetes and type 2 diabetes receive DSME at diagnosis and it should be an ongoing process (ADA, 2015). It is imperative that patients with type 2 diabetes participate in DSME to enable patients to maintain or improve their health status and quality of life.

The purpose of this quality improvement project is to conduct a retrospective medical record review to determine the frequency of documentation of diabetes self-care education referrals provided by primary care providers to patients with Type 2 Diabetes Mellitus and to identify the demographic and clinical characteristics associated with primary care DSME referrals. This study will also evaluate the results of an on-line survey from primary care providers to determine perceived barriers and facilitators of providing self-management education to patients with Type 2 Diabetes Mellitus.

Background

Research concerning DSME has found positive health outcomes such as increased glucose control, which is indicated by the Hgb A1c. North & Palmer (2014) conducted a retrospective chart review analyzing health parameters among individuals (n = 359) who participated in group diabetes education (n = 175) and those who did not (n = 184). The treatment group had a significant decrease of their HgbA1c and weight ($p < 0.001$ and 0.001 respectively). In the treatment group, 15% had a significant weight loss (>5% weight loss), compared with 8% of the control group. The results support the use of DSME with gaining glycemic control with weight loss.

Moattari, Hashemi, & Dabbaghmanesh (2012) conducted a randomized control study with 48 insulin dependent participants. These participants were randomly assigned to either the intervention or the control group. The intervention group received diabetes education electronically for twelve weeks. The control group received diabetes education in the traditional manner, group setting with informational packets to take home. Education included information concerning diabetes, eating habits, monitoring and treatment, and complication management. Measured indicators were Hgb A1c, fasting

blood sugar, triglycerides, LDL and HDL. The intervention group had significantly lower Hgb A1c, decreased from 9.1% to 7.07% (p <0.001) and LDL decreased from 103.04 mg/dL to 94.83 mg/dL (p <0.002). This diabetes educational option allowed the patients to improve their health statuses, and it also did not require providers to decrease their clinic time to provide face to face counseling and education.

Research focusing on measuring whether DSME has the ability to maintain glycemic control was conducted by showing that the glycemic control was maintained for two years post the DSME (Nicoll et al., 2014). Researchers evaluated Hgb A1c levels in patients who received DSME and had medical follow up one year and two years post completion of DSME. Hgb A1c levels were evaluated prior to DSME, immediately after, one year and two years after DSME completion. The study included 43 subjects, with an average Hgb A1c of 10.2% ± 3.7. The average Hgb A1c immediately after DSME was 7.8% (p<0.001). The Hgb A1c remained unchanged at years 1 and 2 after DSME intervention. This study also found that patients who had a diagnosis of diabetes less than one year before attending DSME had a greater reduction of the Hgb A1c compared to those who were diagnosed more than one year before attending DSME. The tools and strategies that are used in DSME can cause positive lifestyle changes and help those living with diabetes decrease the risks of complications later in life.

The ADA recommends that patients with diabetes assume active roles with their care, and this can be done as a result of receiving DSME (2015). Health care providers should include DSME as part of every management plan for patients with diabetes. According to the Center for Disease Control and Prevention (2014b), there are 21 million Americans with diabetes, and an estimated 8 million people with undiagnosed diabetes.

Type 2 diabetes can be managed by maintaining a healthy diet, an active lifestyle, maintaining a healthy weight, and medication adherence (CDC, 2014b). Patients with diabetes can be taught and master these skills in DSME. According to HealthyPeople 2020, in 2010 it was reported that 58.0% of diabetic patients received formal diabetes education. HealthyPeople 2020 has set the goal that 62.5% of patients with diabetes receive formal diabetes education. This goal can be achieved with the help of primary care providers increase the number of patients they refer to DSME as patients are diagnosed as well as during regular follow up.

Study Design

The design for this study was a retrospective, descriptive, cross-sectional medical record review to evaluate the frequency of documentation of diabetes self-care education referrals provided by primary care providers to patients with Type 2 Diabetes Mellitus and to identify the demographic and clinical characteristics associated with primary care DSME referrals. In addition, the primary care providers at this Kentucky health clinic were invited to participate in a confidential online survey to identify perceived barriers and facilitators of providing diabetes self-management education to patients with Type 2 Diabetes Mellitus.

Methods

The study population consisted of the medical records of patients between the ages of 18 and 65 years, diagnosed with Type 2 diabetes, and seen for care at any of the seven locations of a Louisville, KY health clinics between August 1, 2013 and August 31, 2014. The ICD-9 codes of 250.00 (Diabetes Mellitus without complication, Type II or unspecified type, not stated as controlled), and 250.02 (Diabetes Mellitus without

mention of complication, Type 2 or unspecified type, uncontrolled) were used to identify

patient medical records to be included. The study excluded medical records of patients

diagnosed with Type 1 Diabetes Mellitus and Gestational Diabetes Mellitus. Once

medical records of patients who met the inclusion criteria were obtained, 100 records

were randomly selected for reviewing using a research randomizer software program.

Patient identifying data was not collected during data collection. After the University of

Kentucky Institutional Review Board approved the study, the assistant director

distributed an email to the primary care providers with a cover letter explaining the

purpose of the online survey and with a link for providers to access the RedCap online

survey. Provider participation was voluntary to complete the survey.

After data collection, SPSS software was utilized to analyze the results of

collected data and completed online survey results.

The PI received approval to conduct this Quality Improvement project from the

University of Kentucky's Institutional Research Board. Permission was also received

from the medical director and assistant director at the clinic to conduct data collection.

Patient Sample

This was a retrospective medical record analysis of patients with a documented

diagnosis of type 2 diabetes at a large healthcare clinic in Kentucky and were seen for

diabetes follow up between August 1, 2013 and August 31, 2014. The inclusion criteria

yielded 3,094 possible participants. Research randomizer software randomly selected 100

participants for the medical record review. The mean age of participants was 53.39 (SD

9.338) and a median A1c of 9.95% (IQR 7.7%-11.5%). The online survey was distributed

to 28 primary care providers, with an expected response rate of 70% (n=20). There was a total of six (21%) respondents to the provider online survey.

Chart Review

The following data were collected from the participants' medical records: age, race, most recent A1c, random blood glucose, blood pressure, weight, BMI, and medication regime. Medical records did not list a diagnosis date for all the participants. The researcher also reviewed the medical record to determine if participants were referred for DSME. A referral was considered to have been made if the provider had requested for them to attend diabetic education through the clinic's certified diabetes educator, or if they had made a referral to an outside endocrinologist with type 2 diabetes listed as the reason for diagnosis.

Statistical Analysis

Data analysis was performed using IBM SPSS 22.0 statistics software. Statistical analysis used an alpha of $P > 0.05$. The independent variable was "participant received a DSME referral." The dependent variables were age, race, smoking status, most recent A1c, blood pressure, BMI, and medication regime. The researcher conducted descriptive analysis using the chi square test for independence to explore the relationships among variable and the Mann Whitney U tests to explore the relationships between variables (Pallant, 2013).

The chi square test of independence was used to determine if DSME referrals were made based on sex, race, and smoking status. The Mann-Whitney U compared DSME referrals based on A1c levels, random blood glucose, and BMI. An independent T-Test was conducted to compare DSME referrals based on participant age. The Mann-

Whitney U test was the most appropriate test with the A1c and BMI because the data was right skewed, leading the researcher to use a non-parametric test. The online survey results were analyzed using frequency counts of responses.

Results

There were 100 participants medical records reviewed. There were 36 males, 64 females. 39 African Americans, 38 Caucasians, 16 Hispanics and 7 with a race labeled as other. The mean age was 53.39 years, ranging from 32 – 68 years old. Smoking status revealed 38 current smokers, 39 who never smoked, and 21 former smokers. The median A1c level was 7.5% (IQR 6.6-10.0%). The BMI median was 33.1 (IQR 28.65-39.95) these findings are noted in Table 1.

Table 1 shows the relationship between participant characteristics and DSME referral. The chi squared test of independence did not indicate a significant association between sex DSME referral being made, X^2 (1, n = 100) = 0.045, p = 0.83. The chi squared test of independence did not indicate a significant association between race and DSME referral being made, X^2 (3, n = 100) = 0.57, p = 0.90. The chi squared test of independence also did not indicate a significant association between smoking status and DSME referral being made X^2 (2, n = 98) = 1.876, p = 0.39.

The Mann-Whitney U test revealed a significant difference in the most recent A1c level and whether a DSME referral was made (Md = 9.65, n = 22), or not made (Md = 8.053, n = 77), U = 487, z = -3.031, p = 0.002, r = 0.3. The referral rate was higher among those with a higher A1c level. The Mann-Whitney U test revealed no significant difference in the random blood glucose results and whether a DSME referral was made (Md = 45.21, n = 19), or not (Md = 36.26, n = 57), U = 414, z = -1.530, p = 0.126, r =

0.2. The results of the Mann-Whitney U test regarding the participants' BMI and whether

a DSME referral was made did not show a significant relationship (Md = 49.07, n = 22),

or not (Md = 50.9, n = 78), U = 826, z = -0.262, p = 0.793, r = 0.03.

An independent samples t-test was conducted to compare the ages of those

referred to DSME and those not referred. There was no significant difference in ages of

those referred for DSME (M = 53.18, SD = 9.49) and those not referred (M = 53.45, SD

= 9.35; t (99) = -0.118, p = 0.91 two-tailed).

Table 2. Differences in participant characteristics and DSME referral (*N* = 100)

	Referred (*n* = 22)	Not referred (*n* =78)	*Total*
Age, Mean (SD)	53.18 (9.495)	53.45 (9.345)	53.39 (9.338)
Gender, n (%)			
Male	7 (31.8)	29 (37.2)	36 (36)
Female	15 (68.2)	49 (62.8)	64 (64)
Race/ethnicity			
African American	9 (40.9)	30 (38.5)	39 (39)
Caucasian	7 (31.8)	31 (39.7)	38 (38)
Hispanic	4 (18.2)	12 (15.4)	16 (16)
Other	2 (9.1)	5 (6.4)	7 (7)
Smoking status			
Current	7 (31.8)	31 (40.8)	38 (38.8)
Former	8 (36.4)	31 (40.8)	39 (39.8)
Never smoker	7 (31.8)	14 (18.4)	21 (21.4)
A1c, Median (IQR)			7.5(6.6-10)
BMI, Median (IQR)			33.1 (28.65-39.95)
RBG, Median (IQR)			170 (133.5-234)

The on-line provider survey had a response rate of 6 participants. The desired

feedback rate was 71% (n = 20). The age range was 31-61 years (n = 4), with their years

of experience ranging from 3-35 years. The provider types of the respondents were 4

nurse practitioners, 1 MD and 1 unspecified. All respondents rated their comfort level

ranged from 3 – 5 on a five point Likert scale. Group classes and information packets

were reported to be effective methods of providing DSME. Inadequate office visit time

and a lack of staff trained to aid with providing DSME were cited as reasons it was found

difficult to provide DMSE.

Discussion

The results of this retrospective chart review indicated there is an association

between recent A1c levels and primary care providers referring patients to DSME

programs. Patients were more likely to be referred to DSME if they had a high A1c level.

This finding is the opposite of the current guidelines from the ADA, AADE, and the

AACE/ACE. DSME is aimed to assist patients with diabetes to make lifestyle

adjustments to better manage their health and improve quality of life, and should begin

early in diagnosis to prevent or delay complications (AADE, 2015). The results of this

study showed that there were 28.2% of DM2 patients referred for additional counseling

and management for diabetes self-management education. This is below the national

rated of 56.8% reported by the Office of Disease Prevention and Health Promotion

(2015).

The Healthy People 2020 has set many objectives regarding persons with diabetes

mellitus to decrease the diagnosis rates, as well as to decrease deaths and various

complications associated with uncontrolled glucose levels. The Healthy People 2020

objective D-14 aims to increase the rate of adults who receive formal diabetes education from 568% to 62.5%. The realization of this of this objective is dependent of the medical providers who are diagnosing and caring for patients with diabetes (ODPHP, 2015). According to the American Academy of Family Physicians, the follow up visit for a patient with type 2 diabetes should include treatment plan review, medical nutritional therapy, self-management training and education, monitoring instructions, as well as medication regime, lab review, and the physical exam.

Many office visits focus on the medication regime, physical exam and lab results of the patient. The provider often does not have the time to engage in conversation to assess the patient's self-care ability and adherence, and complete the review of medications, physical exam and plan of care. This should encourage primary care providers to work with other disciplines to ensure proper management and education for patients with diabetes. There are additional challenges associated with caring for minorities and those who are low socioeconomic status and low health literacy with diabetes (Schillinger et al., 2002). Individuals with low health literacy and low diabetes knowledge have worse health outcomes (Williams, et al., 1998). This is why it is essential for providers to ensure they explain the necessity of DSME and to provide or refer patients to receive this service.

The findings of this study indicate that approximately one-third of the sample are current smokers (n = 38), this is higher than the Kentucky tobacco use rate of 29% (CDC, 2012). Cigarette smoking increases insulin resistance and the risk for developing type 2 diabetes (Mandeep, 2012). Of the current smokers only n=7 received a referral for DSME. Based on their diagnosis alone they should have received the referral for DSME,

but with the increased risks factors they should have received the referral. The implications of this study indicates the need to provide self-management education to those with type 2 diabetes to delay or prevent the onset of complications associated with uncontrolled diabetes. Further research is needed to assess the effectiveness of offering a DSME program in the clinic setting and introducing a multidisciplinary team approach to managing the care and needs of patients with type 2 diabetes.

Limitations

Limitations of this study include that this sample population is not generalizable to the general population. The population serve at this clinic is comprised of low socioeconomic status and health literacy is a concern. This study is also a cross sectional study, which may lead to ambiguous results (Polit & Beck, 2012). This study design may make it more difficult to determine which variables are influencing the results. Another study limitation is that the sample size and provider response rate were below the recommended sizes. The recommended medical chart review was n = 362, and n = 26 for provider responses. The sample sizes were determined prior to identifying the total sample size.

Recommendations

The findings of this study led the researcher to suggest the implementation of a pilot program to increase the number of participants who participate in DSME. This clinic has a fulltime diabetes educator nurse on staff, and should increase the level of involvement in diabetes patients' care. A trial DSME group program should be implemented at a satellite clinic site. The program should operate for a minimum of three months since that is the length of time the A1c blood test measures glycemic control

(ADA, 2014a). Providers should design the first diabetes follow up visit during this trial along with the diabetes educator nurse. This visit will allow the patient to meet and become familiar with the diabetes educator, and for the diabetes educator to become more familiar with the patients. This is also the time that the providers, along with the diabetes educator, to introduce the patients to DSME and the benefits of participating with the program.

The DSME group classes should focus on topics addressing the disease process, the importance of monitoring and medication adherence, risk management, smoking cessation, etc. Classes should be offered bi-weekly, preferably with morning and afternoon sessions to accommodate the patients' schedules to encourage participation. Pre and post class questionnaires should be used to assess health literacy and patient understanding of information provided to them in the classes. Education methods should include written, visual, and hands on demonstrations to meet patient education needs. Each group session should record the participants' weights, random blood glucose, blood pressure, smoking status, race, and age. Each class should have a specific topic and include an information packet to provide to patients to follow with and review between each class. Participants' A1c levels should be recorded prior to participation and after the completion of the three month program. Pre and post test scores of patient questionnaires should be monitored and an evaluation tool should be provided for patient feedback and suggestions.

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Capstone Report Conclusion

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Conclusion

The first manuscript describes the benefits of patients participating in DSME. These patients have improved glycemic control. Data showed that the results of the improved glycemic control lasted up to one year post participation with DSME programs. More research will need to be conducted to determine the effects of ongoing DSME and the effects of improved glycemic control and health outcomes. The literature does support patients with diabetes to participate in DSME. The American Diabetes Association supports the participation of DSME in patients who have diabetes and prediabetes. DSME helps individuals with diabetes and prediabetes to begin and sustain behavioral changes to prevent or delay the onset of diabetes and complications associated with uncontrolled glucose levels. The results of the Quality Improvement project found that primary care providers seems to refer patients to DSME programs once the A1c is uncontrolled, rather than early in diagnosis to prevent the onset of complications associated with uncontrolled glucose levels. Barriers primary care providers face in delivering DSME included inadequate office visit time and staff that were not trained to assist delivering DSME. Providers identified availability of prepared informational packets and group classes as effective methods of delivering DSME to patients with diabetes.

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