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Implementation of Quality Improvement Interventions to Increase Provider Adherence to Standards of Medical Care in Diabetes

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IMPLEMENTATION OF QUALITY IMPROVEMENT INTERVENTIONS TO INCREASE
PROVIDER ADHERENCE TO STANDARDS OF MEDICAL CARE IN DIABETES

by

ELIZABETH A. BETZ

A CAPSTONE PROJECT

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Abstract

Purpose: To improve a South Texas primary care clinic's diabetes management system by implementation of a quality improvement intervention to help staff and medical providers increase adherence to the American Diabetes Association standards of care related to screening referrals and orders for urine microalbumin, in order to improve self-care and health outcomes for adult patients with diabetes.

Background and Problem: Diabetes is the 7th leading cause of death in the United States and the cause of vision loss, amputations, and end-stage renal disease. The patients at the Wellness Center do not consistently receive routine screenings for neuropathy, retinopathy, nephropathy, microalbumin, and diabetes self-management education as recommended.

Methods: The Doctor of Nursing Practice student conducted a quality improvement project introducing practice-aids to reinforce adherence to the American Diabetes Association recommended diabetes guidelines for screening and referrals. Pre and post intervention evaluation methods were employed.

Results: Provider adherence to diabetes guidelines was measured through documentation in patient records before (N = 50) and after (N = 50) the interventions. The number of referrals to ophthalmologist increased from 48% to 100%, podiatry from 60% to 100%, diabetes self-management education from 10% to 98%, microalbumin screening from 24% to 98%, and inspection of patient feet from 0% to 100%. Nine other quality improvement indicators were also significantly improved.

Conclusions: Practice aids were effective in increasing adherence to the recommended American Diabetes Association diabetes treatment guidelines.

Key words: diabetes, guidelines, quality improvement interventions, primary care

Diabetes is considered to be a complex and chronic disease, and thus it requires continuous medical care and sophisticated risk reduction strategies to ensure the health and wellness of the patient. According to the American Diabetes Association (ADA) (2016), it is important to have continuous self-care diabetes education and support to avoid acute complications and lower the risk of long-term complications in patients, which supports the claim that diabetes outcomes can be improved by implementing methods of educating patients and those in primary care practices.

According to the Centers for Disease Control and Prevention (CDC) (2014), diabetes prevalence and mortality tend to be higher in Hispanic and Latino cultures than any other ethnic group. Diabetes Mellitus (DM) is known as the seventh leading cause of death in the United States (U.S.) and affects over 29 million people. Approximately 8.1 million people who suffer from DM go undiagnosed and an additional 86 million remain at risk for developing DM (CDC, 2014). DM is one of the major factors affecting the increase of heart disease and is the leading cause of end-stage renal disease, limb amputations, early vision loss, and gum disease (periodontitis) (Healthy People 2020, 2016). The estimated cost in the United States in 2007 for DM was approximately \$174 billion and the cost throughout the years has continued to rise, overwhelming healthcare systems nationwide (Healthy People 2020, 2016). Due to the increasing rates of people throughout the country affected by DM, there is a growing concern for the increase of diabetes-related complications. The ADA (2016) standards of DM care include a set of annual screenings to prevent microvascular and macrovascular complications. Microvascular disease affects small blood vessels, creating problems with the eyes (retinopathy), nerves (neuropathy), and kidneys (nephropathy), and macrovascular complications, which affect the larger blood vessels, the heart and brain, which also create problems such as atherosclerotic

cardiovascular disease (ASCVD) and stroke (ADA, 2016). Despite the ADA recommended guidelines for adults aged 18 or older with DM, 35.1 % of patients with diabetes did not have annual dilated eye examinations, 28.8 % did not receive an annual foot examination, and 42.4% did not attend a diabetes self-management class (CDC, 2014).

Because of these statistics, there is a clear need to generate more knowledge and effective ways to promote adherence to the ADA recommended standards for care. Adherence to the ADA guidelines on the part of providers and patients could potentially reduce comorbidities and complications that are commonly associated with diabetes. The guidelines offer suggestions on how to conduct the initial assessment of patients with diabetes, and how to conduct a thorough physical examination and laboratory assessment. Adherence to the guidelines could decrease not only the suffering associated with the disease, but also the cost of care.

The family nurse practitioner (FNP) with Doctor of Nursing Practice (DNP) education is well equipped to address this need in the primary care setting, and to promote adherence to the ADA recommended standards for care. The DNP student is educated to translate knowledge quickly and effectively in order to create a successful evidence based intervention. The doctoral-prepared advanced practice registered nurse (APRN) uses strong collegial relationships derived from being a care provider and team member in the primary care clinic, to identify clinical problems and develop approaches that will strengthen the practice. As a primary care provider with familiarity with the system's processes and knowledge of facilitating change in clinical agencies, the nurse practitioner is in an ideal position to assume the role of project manager, to build on the positive relationships already developed, and to collaboratively work to improve the care that is essential to improved patient outcomes.

Problem

Recently a microsystem assessment was conducted at a primary care clinic, the Wellness Center (WC), located in Brownsville, Texas, in order to evaluate medical care of DM in the adult patient population. That preliminary assessment revealed that patients who had diabetes were not receiving adequate diet education and had poor nutritional practices, which can lead to uncontrolled hemoglobin A1c (HA1C) measurements and other severe comorbidities. A HA1C, or glycosylated hemoglobin, is a test to measure the average blood glucose in the previous 3 months. It is recommended that all patients with diabetes be given the test at least two times per year. The normal range is between 4% – 6 % and for people with diabetes it is recommended that the HA1C should be below 7% to prevent complications of diabetes (ADA, 2016). The results of the initial clinic assessment called for a more thorough needs assessment, which exposed a variety of other health needs that were unmet. When there are unmet health needs, there exists a gap between what is actually happening and what should be happening (Zaccagnini & White, 2014). In order to evaluate and describe the needs of the patients in the microsystem, thorough examinations of the patient medical records, personal observations, and patient questionnaires (The Summary of Diabetes Self-Care Activities (SDSCA), (see Appendix A) were conducted by the DNP student.

The WC is located in South Texas in the city of Brownsville, Texas. In 2014, Brownsville had an estimated population of 183,046 with approximately 9.9% of the population over the age of 65 years (United States Census Bureau (USCB), 2015). Although the city is fast growing, it is still one of the poorest regions in the state and the nation, with more than 35% of the population living below the poverty level of \$14,124 per individual (USCB, 2015). This significant poverty figure does not even take into account the vast number of undocumented

individuals who most likely are unreported in the U. S. census (2015). Compare this figure to the Texas poverty rate of 17.6% and one can see that the number of individuals living below the poverty level is almost double in Brownsville (USCB, 2015). Although economically deprived, Brownsville is rich in Hispanic culture. Over 93% of the residents are Hispanic and the WC provides health care to a vulnerable population of primarily racial and ethnic minorities. Hispanics in South Texas tend to originate from Mexico and are a large segment of those facing economic disparities (CDC, 2015). Diabetes prevalence and mortality are two to five times greater in this group than in other ethnic groups (CDC, 2015). Being that the WC is just minutes away from Matamoros, Mexico lends character and cultural flavor to Brownsville. The music, festivities, and food all overflow and transcend the border. However, this makes the region even more susceptible to disease and in fact Brownsville has some of the uppermost rates for diabetes and obesity. Because diabetes is such a concern in the large Hispanic population it serves, the WC was designed with chronic care management in mind. It was developed to identify and manage patients in the larger parent clinic system that are not adhering to the therapeutic initiatives that have been shown to improve quality of life and survival.

The WC has its own private entrance with visible signs to distinguish it from the mesosystem's front entrance; however, patients do not always see the signs and end up entering the WC through the mesosystem's main lobby. The front desk receptionist will then guide the patient to enter the WC lobby. Therefore, there are two methods to enter the WC. As one enters the clinic, it has a lobby with 14 comfortable blue cushioned seats with decorations that consist of three ivy plants that are positioned evenly in between the chairs. The patients are acknowledged with a friendly "hello" and warm smiles upon entering the lobby and are then asked to sign in at the front desk reception area that is also located in the lobby. The majority of

the patients in this department are Spanish speaking. Therefore, Spanish is the foremost language spoken to patients by staff, while the staff members speak English amongst each other. In addition to the lobby and reception area, the WC has a vital sign screening station, a nurse's station, five patient exam rooms, a restroom, a small conference room, and one provider office that is shared by the physician and the family nurse practitioner. The WC is an example of what is known as the "sharp end" of the health care system, and that is because it is the frontline of care (Nelson et al., 2007). It is in the WC where the patients and providers meet and have direct clinical interaction as well as where the patient needs are intended to be met.

In addition to providing preventative and chronic care to the surrounding community, the clinic provides patients with follow up appointments, quarterly laboratory tests, screenings, and sick visits. Other services the clinic provides are radiology and ultrasound imaging, bone density tests, and laboratory services. The WC only accepts patients by appointments Monday through Friday, 8 a.m. to 5 p.m. The WC and an additional five primary care clinics are owned by an internal medicine physician, and all clinics are located in South Texas. The WC itself employs one family practice physician, one nurse practitioner, one office manager, and seven medical assistants (MAs). The seven MA's roles and responsibilities are to verify that all referrals being made by the medical providers are documented in the patient's electronic medical record (EMR), provide date and time of the appointment to the patient, verify if the appointment was kept by the patient, verify if consultation report was received from the specialist, and then scan the consultation report once received into the patient's EMR. This particular process of care is extremely important especially because it is a general process that will reinforce follow-up diabetes care in accordance to the recommended ADA diabetes guidelines.

The clinic accepts all types of insurance, including Medicare and Medicaid which are the most commonly used. The clinic administers its own healthcare membership program, VAL-U-CARE to make services more affordable and available to uninsured patients. The WC has approximately 175 patient visits per week. Most of the patients who receive care in the clinic are Hispanic and Spanish speaking. The patients reflect the larger community having a low income and a limited education. Complicating the process of data analysis is that all of the information for the microsystem, the WC, is inputted electronically and stored in the same system that the larger mesosystem utilizes. At this time developing a separate information technology (IT) system for the WC would be cost prohibitive, and, therefore, the WC remains on the mesosystem's database, and thus it is difficult to separate out WC patients from the whole system. For example, if the DNP student wants to know how many patients with DM were seen "only" in the WC in the past 12 months, the billing department will not be able to determine this data because currently the patients that are seen in the WC are not separated from the mesosystem. Despite the challenges, the graduate student was able to ascertain a profile of patients and the level of care provided at the WC, by manually reviewing patient electronic medical records. The results of reviewing 84 medical charts of patients with DM were compared to the guidelines of the ADA in the Standard of Medical Care in Diabetes – 2016 (ADA, 2016). The guidelines address the comorbidities and monitoring or screening practices associated with DM. This assessment focused on the extent to which the clinic adhered to ADA diabetes guidelines pertaining to H_{1c}, hypertension, ace inhibitors, aspirin, hyperlipidemia, obesity, tobacco abuse, depression, microvascular complications such as retinopathy, nephropathy, and neuropathy, complications of uncontrolled DM such as amputations, and a referral to

recommended specialists such as an ophthalmologist for an eye exam, a podiatrist for a comprehensive yearly foot exam, and a referral to diabetes self-management education (DSME).

HA1C

The estimated current population of individuals in the WC with DM who have an HA1C above 7% is 77%, based on the 84 charts examined and indicating sub-optimal glucose management. The Summary of Diabetes Self-Care Activities (SDSCA) (see Appendix A) questionnaire results, administered by the DNP student to patients with DM, also showed that the patients were not self-testing their glucose levels consistently. The HA1C goal set by the ADA is less than 7%, because that level has been proven to decrease complications of DM, such as reducing microvascular and neuropathic complications (ADA, 2016). Additionally, Healthy People 2020 set a national benchmark of 16.1% for the population of people with DM who have an HA1C value of less than 7%. Upon comparing the local 77% rate to the benchmark set by Healthy People 2020, it becomes clear that the number of DM patients with an HA1C above 7% was abnormally high.

Hypertension/Ace Inhibitors

The review of the 84 medical records revealed that 79% of the patients were diagnosed with hypertension. Hypertension is a risk factor for atherosclerotic cardiovascular disease (ASCVD) and this risk is particularly elevated and associated with strokes, myocardial infarctions (MI), or angina in diabetes. ASCVD is caused by cholesterol build-up in the arterial walls (ADA, 2016). Therefore, the ADA recommends that the patient's systolic blood pressure should be less than 140mmHg, and those with values of about 120 mmHg should be counseled on lifestyle changes to reduce their blood pressure. The diastolic blood pressure should be less than 90 mmHg. The ADA (2016) also recommends pharmacological therapy should consist of

either an angiotensin-converting enzyme (ACE) inhibitor or an angiotensin receptor blocker (ARB) for patients with DM and hypertension to effectively lower blood pressures. This therapy can also reduce cardiovascular events and prevent or slow the progression of kidney disease (ADA, 2016). Despite, these recommendations, of the 79% of patients with DM and hypertension, only 48% were on an ACE inhibitor or any other anti-hypertensive agent. The DNP student also observed that although the vast majority of the patients presented with hypertension, the medical provider failed to provide education on life-style modifications, refer the patient to DSME, and/or failed to identify any anti-hypertensive therapy. However, blood pressure measurements were obtained for every patient on every office visit which is in accordance with the ADA diabetes care guidelines.

Aspirin

Out of the 84 patients reviewed, only 36% were prescribed aspirin as is recommended. Aspirin is an effective antiplatelet agent, and reduces cardiovascular morbidity and mortality in high-risk patients with a history of stroke or MI (secondary prevention) (ADA, 2016). The ADA recommends prescribing aspirin therapy (75-162 mg/day) for patients with DM that are at increased risk of developing cardiovascular disease (primary prevention) (10-year risk >10%) and for secondary prevention when there are no contraindications (ADA, 2016). The aspirin guideline applies to patients with DM, aged greater than or equal to 50 years and who have one additional risk factor such as hypertension, smoking, dyslipidemia, or albuminuria, and who do not have a risk for bleeding. This is a large segment of the WC population as 79% of patients had a diagnosis of hypertension, 69% had a diagnosis of hyperlipidemia, 7.8% used tobacco, and 18% had a diagnosis of nephropathy although only 36% of the 84 patients were on aspirin therapy. The DNP student observed that although the MAs were entering a patient's new

medications into the EMR, asking the patients if they had any changes to their medications, and if they needed refills, the medical providers were not monitoring the patients with cardiovascular risk factors for aspirin therapy.

Hyperlipidemia

More than half of the 84 patients (69%) had a diagnosis of hyperlipidemia, and all of these patients were on statin therapy as recommended by the ADA diabetes care guidelines (ADA, 2016). The recommendation of the ADA is to counsel the patients on diet education and lifestyle changes in order to lose weight if needed and reduce the intake of fats and cholesterol. However results of the SDSCA questionnaire demonstrated that 41% of the 84 participating patients were eating foods high in fat on a daily basis. Additionally, 74% of patients diagnosed with hyperlipidemia, admitted to eating high fat foods. The medical provider failed to refer these patients to DSME which may assist patients adhere to diet recommendations.

Obesity

The review of the patient charts revealed that almost 47% of the 84 patients were considered obese based on a body mass index (BMI) over 30 kg/m². Only 13% reported following a healthful eating plan 5 or more days a week. The SDSCA questionnaire outcomes indicated patients were not following a healthful eating plan, did not usually eat fruits and vegetables, and regularly ate high-fat foods. Additionally, very few of the patients were exercising. The ADA guidelines state that there is evidence that weight loss can improve glycemic control and reduce the need for medication in patients with DM (ADA, 2016). Therefore, the ADA (2016) recommends that the BMI of each patient should be calculated based on height and weight and recorded in the record. Further, it is suggested that the provider discuss the fact that a higher BMI indicates an increased risk of cardiovascular disease and other

comorbidities. During the DNP student observations it was noticed that although the MAs did document the BMI on every routine visit in accordance with the ADA diabetes care guidelines, they did not inform the patients of their BMI during the vitalizing process. In addition, the medical provider did not provide education to the patients regarding the complications of being overweight, and the effects it could have on their DM. Furthermore, the results indicate that even though many of the patients are obese, and lack diet and exercise education, they are not being counseled on their weight management. Additionally, only 10% of the 84 diabetic patient records reviewed were referred to DSME.

Tobacco Abuse

The results of record reviews demonstrated tobacco abuse for only 7.8% of the 84 patients. Results of the SDSCA questionnaire were consistent with these findings. The low rate is important because the ADA recommends complete cessation of smoking and other forms of tobacco abuse for all patients with diabetes, which contributes to lowering the risk for ASCVD (ADA, 2016). The DNP student observed that the medical providers did not discuss smoking cessation with any of these patients.

Depression

Most of the 84 patients (57.4%) had a past medical history of depression. Depression, a mental health disorder, is increased 1.7-fold in patients with DM and therefore it is important to screen for psychosocial issues during routine management visits (ADA, 2016). Depression affects 20-25% of people with DM, and people that have both DM and depression are at a twofold increased risk for developing a myocardial infarction (ADA, 2016). According to the ADA (2016), it is recommended screening all patients with DM with one of these instruments: the Patient Health Questionnaire-2 (PHQ-2), the Diabetes Distress Scale (DDS), or Problem

Areas in Diabetes (PAID)-1 scale. The ADA also recommends referral to a mental health specialist, and “stepwise collaborative care approach” to manage DM comorbid depression (ADA, 2016). The WC uses the PHQ-2 during annual physical exams and if there is an indication of mental health issues the medical provider checks to see if the patient is on an antidepressant medication; if not, an antidepressant will be prescribed. Although the WC is screening for depression in accordance with the ADA DM care guidelines, the patients are not being screened at every routine visit as recommended. If a patient is not receiving antidepressant therapy, it can impair the patient’s ability to manage their DM self-care tasks and can therefore compromise their health status (ADA, 2016).

The extent to which diabetes complications were present in the clinic population was also assessed, as were the rates of referral to specialists. The results for each are reviewed below.

Retinopathy /Eye Exam Referral to Ophthalmologist

A small percentage (13%) of the 84 patients reviewed had a diagnosis of retinopathy. Retinopathy is the leading reason for blindness in adults and a known risk relative to DM (ADA, 2016). Diabetic retinopathy is caused by the blood leaking from the blood vessels that supply the retina, the light-sensitive tissue at the back of the eye (Diabetes Forecast, 2013). Glaucoma, cataracts, and other eye diseases can also occur as a complication of DM (ADA, 2016). The ADA recommends annual screenings in order to prevent retinopathy, however only 51% of the 84 patients reviewed were referred for an eye exam in the past 12 months, and, therefore, are at increased risk of having an undetected complication.

Microalbumin/Nephropathy

According to the 84 charts reviewed, only 26% of the patients were screened for the presence for microalbumin in the past year. The presence of microalbumin in the urine is an

indicator of an early stage of nephropathy, as well as a marker for increased cardiovascular disease. Diabetic kidney disease exists in 20-40% in patients with DM and it is also the primary cause of end-stage renal disease (ESRD) (ADA, 2016). More than 18% of the 84 patients have a diagnosis of nephropathy, which is the most common cause of end stage renal disease.

Therefore, in order to screen for nephropathy the ADA recommends an annual urine test to assess for presence of albuminuria (ADA, 2016). The DNP student did not observe any patients being instructed to submit a urine sample; therefore if this guideline is being followed at all, it is not being done consistently. In addition, the medical providers were not checking to see if the patients had a microalbumin documented in the EMR in the past year during the patients' routine DM management visit. Out of the 84 medical records that were reviewed, there were only 20 microalbumin urine tests documented.

Foot Exam/ Podiatrist Referral/Amputations

The patient chart review showed that 62% were referred to a podiatrist for a comprehensive annual foot exam within the last 12 months. However, the DNP student also observed during many of the examinations, the patients were not asked to remove their shoes, nor were they educated on foot self-care. For example, on one particular day, the MA did not ask eight out of ten patients to remove their shoes in the exam room and the medical provider failed to inspect the feet. This was reflected in the SDSCA questionnaire as well because 60% of the patients reported they were not inspecting their feet daily. This is a significant oversight because DM can lead to severe complications such as foot ulceration, peripheral arterial disease (PAD), and even amputation (ADA, 2016). For these reasons the ADA recommends that the feet should be examined at every routine office visit, and a referral should be made for an annual comprehensive foot examination (ADA, 2016). Fortunately, only 2.6% of the 84 patients

suffered from a DM-related amputation. The ADA states that amputations are a common consequence of uncontrolled DM, poor circulation, and propensity for infection, and early recognition and treatment is the key (ADA, 2016). By examining the feet for ulcers on every routine diabetes care visit, the risk for amputations can be greatly reduced (ADA, 2016). Again, clinic providers have not been examining the feet during the routine visit, nor have they been providing the patient with education on how to care for their own feet.

Neuropathy

About a quarter (26%) of the 84 patients reviewed had diabetic neuropathy. Diabetic neuropathy is nerve damage that commonly develops in individuals that have had DM for a number of years and have high HBA1C levels (ADA, 2016). Autonomic neuropathy and chronic sensory and motor peripheral neuropathy are the most common (ADA, 2016). All patients should be screened at least annually in order to detect and avoid advanced neuropathy (ADA, 2016). Currently, there is no test available in the WC to assess whether the patient has diabetic neuropathy. That is another reason that referral of patients with DM is important. In addition to conducting a comprehensive foot exam, the podiatrist will do a microfilament test to check for neuropathy.

DSME

Only 10% of the reviewed 84 patients were referred to a DM educator. The ADA recommends that all people with DM should be participating in DM self-management education (DSME) to facilitate the knowledge and skills that are necessary for patients to provide their own DM self-care (ADA, 2016). These include: 1) techniques to know how to handle the symptoms of DM, hyper/hypoglycemia, fatigue, and emotional problems such as frustration, anger, and depression; 2) exercises that are appropriate to keep and improve strength; 3) how to acquire

healthy eating habits; 4) how and why to use medications; and 5) skills on how to use a glucometer correctly and monitor their blood sugars, as well as inspecting their feet effectively (ADA, 2016). The ADA recommends that every patient with DM receive an annual DSME for assessment of nutrition, education, and emotional needs, and at the time of diagnosis; as well as when an unexpected complicating factor develops; or when changes in the care occur (ADA, 2016). The key outcomes of DSME is for the patient to acquire effective self-management skills, high quality health status, improved clinical outcomes, and most important the quality of life (ADA, 2016).

Despite these recommendations that are intended to prevent microvascular complications, the medical providers only referred 10.4% of patients with DM to DSME. Since the WC does not provide DSME classes for their patients, the medical providers are supposed to refer the patients to a local hospital that provides free DSME. According to Valley Regional Medical Center (VRMC) the patient is not responsible for any fees. The only requirement from the patient is a referral from a medical provider and their current laboratory results including a HA1C (Valley Regional Medical Center, 2016). The free DM management clinic at VRMC will help the patient take control of their DM (VRMC, 2016).

Through systematic identification, a variety of problems were identified at the WC related to the medical care for DM. However, the most significant findings revealed that out of the 84 patients only 52% had been referred to an ophthalmologist for an annual dilated retina eye exam, 62% referred to a podiatrist for an annual microfilament foot exam, only 10.4% to DM self-management education (DSME), and 26% had a urine microalbumin test done according to the documentation in the patient's EMR.

In conclusion the DNP student determined the ADA DM care guidelines were not being properly applied at the WC in accordance with the “Standards of Medical Care in Diabetes - 2016”. It was clear that there was the opportunity for improvement, not just in the processes of care, but also in the patient outcomes and their self-care abilities. Focusing on promoting provider adherence to the ADA DM guidelines through referral screenings to ophthalmologist, podiatrist, DM self-management education, and urine microalbumin through a QI intervention could improve processes of care and patient outcomes.

General Aim

The general aim of this quality improvement project was to improve patient self-care and outcomes in patients with DM at the WC by implementation of quality improved interventions to influence MAs and providers to effectively utilize evidence-based practice tools in order to increase adherence to the ADA DM care guidelines.

In order to achieve the general aim, three objectives were developed as follows:

(1) By September 2016, a management system will be implemented at the WC to improve the provision of patient care and to increase compliance and utilization of the ADA DM guidelines.

(2) By September 2016, MAs and providers will have improved knowledge in the application of current DM ADA management guidelines.

(3) By September 2016, MAs and providers will have improved skills and behaviors in the application of current DM ADA management guidelines.

Prior Research

While there was clear administrative and provider support for the use of comprehensive DM management guidelines with patients, the results of the needs assessment in the clinic

indicated that it was necessary to alter the direction and approach to providing care. Due to the complexity of DM management, the additional time required for DM care, and the lack of a reminder system, the medical providers were not adhering to the ADA recommended standards for DM care. Because of the numerous components of care that are dependent on the actions of staff and providers, routine screening and referrals in accordance to the ADA recommended DM guidelines were not consistently being performed. Therefore it was necessary to focus on assisting clinic medical providers and staff to adhere to the recommended ADA DM cares guidelines. With this in mind, there was a clear need to implement evidence-based interventions to increase provider adherence to the guidelines and to improve the management of this chronic and complex disease. Therefore, the question that directed the search for effective strategies to improve the care patients in the WC received, was: In a primary care practice that cares for patients with DM, will an improved management system increase adherence to the ADA DM guidelines for routine screenings and referrals?

Review of Literature

Provider adherence and diabetes flow sheets. Numerous studies in health care literature support the role of DM flow sheets in improving provider adherence to the recommended DM care guidelines. A flow sheet is a one page visible cue that summarizes the necessary patient information related to a condition, such as DM. Typically these forms represent current care guidelines that are intended to enhance the quality of DM care, and their effectiveness has been studied by numerous researchers (Hahn, Ferrante, Crosson, Hudson, & Crabtree, 2008; Hempel, 1990; Moharram & Farahat, 2008; Pastel, Liu, Homa, Bradley, & Batalden, 2009; Patasi & Conwary, 2008; Ruoff & Gray, 1999; Umar-Kamara & Tufts, 2013; White, 2000).

In a large randomized control trial by Hahn et al. (2008), the authors analyzed medical records from 1,016 patients seen throughout 54 clinics. The charts were assessed for the use of DM flow sheets and scores for adherence, on a 100-point scale, were assigned. The authors found that where DM flow sheets were utilized there was a better rate of adherence to the National Diabetes Education Program DM guidelines. DM flow sheets were used in 23% of the diabetic medical records. In the records where the flow sheets were utilized a mean score of 55.38 was attained on the 100-point scale, as opposed to the 50.13 points earned where flow sheets were not used. One limitation that the authors noted was they were unable to deduce which providers, if any, were trained in the use of the flow sheets.

In a smaller scale study conducted by Ruoff & Gray (1999), the authors acknowledged that physicians do not always provide the necessary preventative and therapeutic care needed for diabetic patients, and they hypothesized that adherence to the recommended ADA guidelines could be increased with the use of a DM flow sheet. After a baseline was established for the patients, the providers received training regarding the use of a flow sheet and a flow sheet was inserted into all 114 charts. Of the 114 patients tracked, 109 returned for care during the intervention period and the providers used the flow sheets with them. The post intervention improvement was so marked that 6 out of 7 quality indicators were enhanced. The results of this study indicate that the implementation and use of a flowsheet led to an improvement in education and performance of DM care.

Similarly, in a Canadian study, there was an attempt to close the gap in levels of practice and those recommended by the Canadian Diabetes Association through use of a DM flow sheet (Patasi & Conway, 2008). In this study, guideline compliance was improved, and patients reaped the benefits. The average fasting glucose level was lowered from 11.03 mmol/L to 7.7 (where the

normal level was 5.6 mmol/L), and the average HA1C levels were lowered from 7.9% to 5.6% (with the target level being under 7%). There was also a significant increase in the amounts of patients who were using angiotensin-converting enzyme inhibitors, statins, angiotensin II receptor blockers, and acetylsalicylic acid. All of the improvements could be attributed to the implementation and use of the DM flow sheet (Patasi & Conway, 2008).

The benefits of using a DM flow sheet can extend beyond the medical improvements. One study indicated that the use of flow charts can even free up time for providers to address patients' more complex care issues (Pastel et al., 2009). In the Pastel et al. study, licensed nursing assistants (LNAs) were delegated the primary responsibility of completing the flow sheets for patients with DM, and documented the care provided. By increasing the role of the LNA, the providers were afforded with more flexibility and time to spend with the patients. Additionally, the study found that by empowering the LNAs and engaging them at the "frontlines of patient care" the nursing assistants were more likely to feel personally involved (Pastel et al., 2009).

These studies revealed the advantages of utilizing a DM flow sheet in patients with DM. The majority of the studies showed an improvement in patient education documentation, an increased provider adherence to DM guidelines and in meeting diabetic quality control measures for adults (Hahn et al., 2008; Hempel, 1990; Moharram & Farahat, 2008; Patasi & Conway, 2008; Pastel et al.; Umar-Kamara & Tufts, 2013), and the improved documentation of recommended self-management education and referrals to a specialist (Ruoff & Gray, 1999). Overall, these studies concluded that an evidence-based intervention, such as implementing a flow sheet, can help medical providers increase adherence to recommended DM guidelines, improving the management in DM.

Practice-aids/reminders. A practice aid reminder is a tool that can be used as a visual reminder for providers to perform an activity that will help improve a patient's health care. A pre- and post- intervention design was used in a study that was conducted in a primary care practice located in the southeastern U. S. (Umar-Kamara & Tufts, 2011). The authors discussed how labels on a paper chart with a foot design served as a reminder for the provider to perform the annual foot exam. A foot sign was also placed in the exam room as a reminder for the patients to remove their shoes. Other visual reminders in the patients file, such as referral forms and letters, also served as practice aids. The sample consisted of 50 medical records and the purpose of the study was to determine the impact of a quality improvement intervention on increasing provider adherence to the recommended standards of DM care. The authors concluded that there was a rate increase in urine microalbumin test performed, annual eye exams documented, and foot screenings by using simple practice-aids such as DM flow sheets, guidelines, reminders, and standard referral forms (Umar-Kamara & Tufts, 2011).

Promoting diabetes self-management education. DM is considered to be a complex and chronic disease, and thus it requires continuous medical care and sophisticated risk reduction strategies to ensure the health and wellness of the patient (ADA, 2016). According to the ADA (2016), it is important to have continuous DM self-care education and support to avoid acute complications and lower the risk of long-term complications in patients. The goal of Diabetes Self-Management Education is to support the patient in making informed decisions, improving their self-care behaviors, and improving collaboration with the patients' health care team. There are different approaches to educating the patient, and there is no one preferred method. The goal can be achieved through facilitating the patient's knowledge, skill, and abilities they need for DM self-care.

There are numerous studies that indicate improved patient self-care abilities and outcomes after a patient participates in a DSME program (Nicoll et al., 2014; Sanchez, 2011; Steinsbekk, Rygg, Lisulo, Rise, & Fretheim, 2012; Sugiyama, Steers, Wenger, Duru, & Mangione, 2015). For example, one study implemented a quality improvement project focused on increasing DSME referrals with the primary goal to improve outcomes for a patient population with DM (Sanchez, 2011). The sample consisted of 70 patients in a private internal medicine clinic in South Texas. The outcome data based on the ADA DM guidelines demonstrated a positive impact after patients had attended three DSME classes between a 3 months period. The results indicated that more than 50% of the patients maintained a blood pressure less than or equal to 130/80 mmHg, and more than 50% also demonstrated HA1C levels below than or equal to 7% compared to the baseline level of 7.95% (Sanchez, 2011). In another study, the authors also found positive findings in a retrospective evaluation in a sample of 43 patients with DM that attended two DSME classes with 10 hours of instruction. Findings revealed the mean HA1C before DSME was 10.2% and decreased to 7.8% right after attending DSME program ($p < .0001$), a reduction of 23.5% from the initial HA1C. These groups' mean HA1Cs 1 and 2 years post the DSME program remained unchanged at 7.8% for 2 years after the DSME classes. The study concluded DSME was able to improve glycemic control and sustained it effectively up to 2 years (Nicoll et al., 2014).

This review of literature clearly demonstrates a positive impact of attending a DSME program, and medical providers must therefore recognize the benefits and refer all patients with DM to DSME in accordance to the ADA standards of medical care in DM. This process will provide quality self-care abilities and outcomes.

The assessment showed that a quality gap existed in DM care in the WC, yet there were no effective strategies in place to help providers adhere to the standards of DM care in primary care settings. Most of the patients with DM received their care in this primary care setting and therefore it was crucial to implement quality improvement interventions to have a maximum improvement in outcomes. With this in mind, effective methods must be utilized to provide a positive impact on DM processes of care in the WC.

Refined Aims of the Project

In this project, the aim was to improve provider adherence to the ADA standards of care DM guidelines as evidenced by pre and post measures of referral screenings to the ophthalmologist, podiatrist, DM self-management education, and for urine microalbumin.

Following are the questions that guided this project:

- Does implementation of a color folder system and a DM flow sheet as part of DM care management system improve the provision of care and the adherence to guidelines?
- Is there an improvement in the medical assistants' and providers' knowledge of the processes of DM care guidelines after receiving education on the components of the recommended ADA DM guidelines through four training sessions in late June 2016?
- Is there an improvement in the medical assistants' and providers' skills and behaviors in accordance with the ADA DM guidelines, after receiving education on the components of the required roles and responsibilities through the four training sessions in late June 2016?

Methodology/Project Plan

Design

The project was conducted at the Wellness Center and utilized a pre- and post-intervention design. The planning of the intervention started after the needs assessment data analysis revealed identifiable gaps in meeting the needs of patients with DM. It followed the Who-What-When-Where organizing framework. The plan was for the DNP student (*who*) to implement a quality improvement intervention (*what*) at the WC (*where*) that started on June 27, 2016 (*when*) to September 05, 2016 through the implementation of a training session and improvements to the DM management system (*how*). This intervention was made possible through the support of stakeholders, front-line staff and administration.

Stakeholders

Stakeholders are key individuals that can be affected by the outcomes of the project and who also have a vested interest (Zaccagnini & White, 2014). Stakeholders have the capability to help accomplish the project's planned goals and therefore the DNP student first assured that there was support from these individuals in order to have a successful project implementation. Stakeholder support is crucial and therefore stakeholders must have an understanding and be kept informed of the project goals (Moran, Burson, & Conrad, 2014). Hence, the owner of the WC, who is an internal medicine physician, the chief executive officer, and the medical staff are all considered stakeholders. An ongoing collaboration was maintained with them throughout the microsystem assessment and a focused needs assessment, and they demonstrated their involvement in project planning by expressing their willingness to improve the management system. The owner and the chief executive officer held a meeting with members of the microsystem, specifically the staff, to inform them that they were willing to improve and change

processes to improve patient self-care and outcomes and were looking forward to the project outcomes. They also informed the staff of the WC that they had encouraged Human Resources, the billing department, and the IT department, including the staff of the WC to provide the DNP project leader and the team with data/information that was necessary to facilitate the project goals. In addition, the clinic leadership also predicted the difficulty in obtaining demographic data from the WC due to IT issues and assured the team that they would develop a plan to separate the WC's demographic data from the rest of the primary clinic in order to provide accurate data.

The other stakeholders included the owner, the DNP student's mentor who was the physician provider at the clinic, one nurse practitioner, one office manager, the patients, and seven MAs. A key stakeholder was the internal medicine physician, who is also owner of the WC. He expressed his main purpose at the WC was to ensure that all of the standards are adhered to in order to improve the care for patients with DM. His key interest was in having all the necessary referrals made. All of the staff demonstrated an enthusiasm for the project and a willingness to learn and change. Because the WC was a small and cooperative practice, the DNP student did not encounter a lot of resistance.

Patients are also key stakeholders and the DNP student learned that the patients have the utmost faith in their providers. Although they do not know about the DM guidelines or standards of care, they believe that their providers do their best to provide them with the most effective health care possible. Therefore, we as medical providers have a duty to meet those expectations.

Interventions and Outcome Measures

In June 2016 four training sessions were held for staff and providers. Then data were extracted from 50 EMRs that met inclusion criteria to establish baseline levels of adherence to

DM standards of care. The QI interventions were implemented from June 27, 2016 to September 05, 2016. During this time a color folder system and a DM flow sheet were implemented as part of the DM care management system. After the intervention period, a post intervention review of another 50 EMRs was conducted to ascertain the effectiveness of staff training and the practice aids.

Training session. In order to effectively implement the patient management system changes, providers and staff needed to increase their knowledge of the recommended components of the ADA DM guidelines (see Appendix C), and become familiar with their expected roles and responsibilities (see Appendix D). Therefore, the MAs and medical providers attended four 30 minute training sessions held twice a week for 2 weeks as part of the initial phase of the implementation process.

The DNP student conducted the training sessions. The trainings were held from 8:00am-8:30am, during working hours, and before the patients arrived; while the staff met for the training one of the receptionists from the mesosystem covered the front desk. The first two training sessions covered the recommended components of the ADA DM guidelines. The ADA guidelines have extensive recommendations, but for the purpose of this training only key components were emphasized in an attempt to increase the staff's knowledge of DM care (see Appendix C). The final two training sessions focused on the expected roles and responsibilities of the MAs and providers (See Appendix D). The training sessions also covered practical matters such as information about the practice aids to be used, how to use the flow sheet, care processes with the clinic, and how to upload the documents to the EMR, etc.

Training outcome: knowledge. The measure used to assess an increase in knowledge was an 11 item Test for the Components of the Recommended ADA Diabetes Guidelines that

was summed to produce a knowledge score, (see Appendix E). Pre- and post-intervention means were compared.

Training outcome: behavior. In addition to learning about ADA DM guidelines, the MAs and providers became familiar with their expected roles and responsibilities through the training sessions (see Appendix D). The measures The DNP student used to assess the MAs and providers' behavior according to their responsibilities were two checklists, the "Checklist" for Medical Assistants' Roles and Responsibilities' for the Recommend Components of the ADA Diabetes Guidelines, and the "Checklist" for Medical Providers' Roles and Responsibilities' for the Recommended Components of the ADA Diabetes Guidelines, that were developed by the DNP student (see Appendix F). While actual staff behaviors were observed by the DNP student to detect difficulties or alterations from clinic procedures, these were not tracked or tabulated. The DNP conducted pre and post intervention chart audits to determine if the required behaviors were adhered to. Although the checklist has many behaviors on it, for the purposes of this QI project, 14 behaviors were tracked: whether the provider made referrals to ophthalmologists, whether the provider made referrals to podiatrists, whether the provider made referrals to DSME, and whether the provider submitted lab orders for urine microalbumin testing. Additional behaviors included: whether the provider inspected patients' feet, whether the MA documented an HA1C, whether the provider treated for hypertension as indicated, whether the MA documented BMI measures, whether the MA documented random blood sugar tests, whether the MA documented if the patient had a functional glucometer, if the provider treated for hypoglycemia as indicated, if the provider treated for hyperlipidemia as indicated, if the provider recommended aspirin therapy as indicated, and if the MA used and uploaded the DM flow sheet into the EMR.

Diabetes care management system improvements. During the needs assessment the DNP student noticed two key care process breakdowns. First, patients with DM were not always identified as such. If patients came into the WC for reasons unrelated to their DM, there was no guarantee that the provider would adhere to the ADA guidelines such as making necessary referrals, inspecting the patient's feet, or prescribing treatment where indicated. Nor was it certain that the MA would perform the recommended behaviors such as checking for necessary referrals, removing the patient's shoes, or conducting random blood draw. Second, there was no easily usable system in place to remind providers to perform recommended behaviors or to record which referrals had been made. For example, if an MA wanted to determine if a patient had been referred to a podiatrist they would have to click through multiple EMR windows, and open multiple attachments in order to make that determination. The process was very time consuming, and led to referrals not being made or checked. In order to remedy these problems a color folder system and DM flow sheet were implemented.

Color folder system. To increase identification of patients with DM these patients' records were assigned a special color folder. When a patient with DM checked in at the front desk, the MA, acting as a receptionist, would enter the patient name into the computer. When that file was pulled up, an icon presented indicating the patient's diabetic status. This icon prompted the receptionist to place the patient's super bill, a detailed form used by medical providers that reflects rendered services, into a green folder, instead of the standard blue folder. Additionally, the MA was instructed to place a DM flow sheet in the folder. In order to ensure this process was followed a box on the computer that read "Green Folder and Flow Sheet Provided" must have been checked before exiting the system.

The green folder was an automatic indicator to the MA and provider that this was a patient with DM who required a particular level of care. This was intended to prompt them to utilize the DM flow sheet (see Appendix B), and initiate the required behaviors (see Appendix D).

Diabetes flow sheet. The goal of the DM flow sheet was to remind the MAs and medical providers to perform the recommended behaviors, and to assist the medical providers to review the form every time a patient with DM was seen regardless of whether the patient chief complaint was a cough, sore throat, fever or any other problem. Further, the flow sheet provided a uniform place to record all referrals made, and other measurements that are important to track in patients with DM, such as HA1C, glucose, and foot exams (see Appendix B).

Hence, the DM flow sheet (see Appendix B) was developed by the DNP student for the WC in accordance to the ADA Standards of Medical Care in Diabetes – 2016 in order to facilitate adherence to the guidelines, and ease the tracking of the recommended lab results and the annual examinations. This DM flow sheet was designed to include the patient data and measures for each of the standards. Most importantly for this QI project, a space indicates when the appropriate referrals were made to an ophthalmologist, podiatrist, DSME, and for a microalbumin laboratory order. The MAs filled out a paper version out prior to or during the course of the patient-physician encounter. The MA checked for prior referrals and recorded the dates; if there were no referrals in the EMR then the MA included a referral form for the provider to fill out. Vital signs and measurements were also recorded on the DM flow sheet and at the end of the visit the flow sheet was scanned into the EMR. The scanned flow sheet had a designated spot in the EMR indicated by a button that read “Diabetes Flow Sheet.” At subsequent visits it was expected to be easier for MAs to assess what referrals had been made by looking at the DM

flow sheet which had been uploaded in its designated spot, as opposed to clicking through multiple EMR attachments.

Diabetes guideline adherence outcomes. The DNP student established baseline levels of adherence to DM guidelines by conducting pre-intervention chart audits. The inclusion criteria were that the patient was over the age of eighteen; had a diagnosis of DM for at least 1 year; and had attended a minimum of two office visits to the WC within the past year. Of the charts that met the inclusion criteria, 50 were chosen to establish a baseline. Each chart was reviewed and the DNP student documented which behaviors were performed according to the checklist.

After the intervention period, a post-intervention review of 50 EMRs was conducted. These 50 charts were not the same 50 charts assessed pre-intervention. The inclusion criteria for the post intervention review were that the patient was over the age of eighteen; had a diagnosis of DM for at least 1 year; had a minimum of two office visits to the WC within the past year, and that the patient was seen in clinic during the intervention period (from July 11 to September 05, 2016). Of the charts that met the inclusion criteria, 50 were chosen to assess the results of the intervention. The goal of this post-intervention review was to assess whether the required behaviors were being performed post-intervention. Each chart was reviewed and the DNP student documented which behaviors were performed according to the checklist.

Evaluation Model

The W. K. Kellogg Foundation (2004) Logic Model Development Guide was utilized during planning the implementation and evaluation processes as it provided a systematic and visual display of all the activities and outcomes of the project (see Appendix G). This model provided the program planner a clear picture of the “why” and “how” the program should work. This logic model methodology allows one to improve, describe, discuss, and share the theory

during the process of planning, implementing, and evaluating the program. It is a tool that can be used at any time during the development process of the program as well as describing the order of events relating to change and activity outcomes.

Table 1, Measures for Objectives, shows how the DNP student evaluated each objective. This table visually displays each outcome measured for each objective. This table also helped the DNP student determine whether the objectives were working as planned.

Setting

The project was conducted in a small private wellness center (WC) located in a mid-size South Texas city. The WC has only five patient rooms, and serves about 175 patients per week. The main goal of the WC is to provide preventative and chronic care to the surrounding community, however the clinic also provides patients with follow up appointments, quarterly laboratory tests, screenings, and sick visits. Most of the patients are Hispanic, Spanish speaking, and reflect the larger community by having a low income and a limited education. The WC team consists of one family practice physician, one nurse practitioner, one office manager, and seven medical assistants (MAs).

Sampling Strategy

Two samples of medical records were taken: one pre intervention and one post intervention. The samples were derived from a list manually compiled by the DNP student, of all the patients in the WC with DM. The inclusion criteria for the first sample was that the patient was over the age of eighteen, had a diagnosis of DM for at least 1 year; had a minimum of two office visits to the WC within the past year. Of the patients that met the inclusion criteria 50 were

Table 1

Measures for Objectives

Objective	Indicator or Measure	Statistic
<p>Obj. 1</p> <p>By September 2016, a management system will be implemented at the WC to improve the provision of patient care and, increase compliance and utilization of the ADA DM guidelines.</p>	<p>a. Utilization of DM flow sheet.</p> <p>b. Utilization of color folder system.</p>	Comparison percent usage pre and post intervention.
<p>Obj. 2</p> <p>By August 2016, MAs and providers will have improved knowledge in the application of current DM ADA management guidelines.</p>	Knowledge of DM management components as measured by pre and post intervention test.	Comparison of means pre and post intervention
<p>Obj. 3</p> <p>By September 2016, MAs and providers will have improved behavior/ skill in the application of current DM ADA management guidelines.</p>	<p>a. Documentation in the EMR by MAs and providers of the following activities/components:</p> <ul style="list-style-type: none"> - Referral to an ophthalmologist, podiatrist, and DSME. - Ordering of urine microalbumin laboratory tests. - Inspection of feet on each visit. <p>b. EHR documentation of:</p> <ul style="list-style-type: none"> - HA1C. - Blood pressure measurement. - Basic metabolic index (BMI) measurement. - Random blood sugar drawn. - A functional glucometer check. - Hyperlipidemia drugs (statins) review. - Aspirin prescribed if not contraindicated. - If hypertensive, ACE/ARB prescription reviewed. 	Percent change from pre to post intervention

selected randomly. The WC's pre intervention sample's demographic profile is presented below (see Table 2). The ages of the sample ranged from 50-89 years of age. The majority of the sample was female (56%). The race and ethnic orientation of the sample was largely Hispanic (72%).

Table 2

Demographics of Pre-intervention Sample (N= 50)

Variable	<i>n</i>	%
Gender		
Male	22	44
Female	28	56
Age		
50-59	32	64
60-69	12	24
70-79	4	8
80-89	2	4
Race		
Hispanic	36	72
African American	8	16
non-Hispanic White	5	10
Asian	1	2

For the second sample of EMR records, only patients that had been exposed to the intervention were selected. Therefore the inclusion criteria was that the patient was over the age of eighteen; had a diagnosis of DM for at least 1 year; had a minimum of two office visits to the WC within the past year; and were seen in clinic during the intervention period (from July 11 to September 05, 2016). Of the patients that met the inclusion criteria 50 EMRs were selected randomly. The WC's post intervention sample closely paralleled the pre-intervention sample's demographic profile and is presented below (see Table 3). The ages of the sample ranged from 50-89 years of age. The majority of the sample was female (54%). The race and ethnic orientation of the sample was largely Hispanic (74%).

Table 3

Demographics of Post-intervention Sample (N = 50)

Variable	n	%
Gender		
Male	23	46
Female	27	54
Age		
50-59	33	66
60-69	11	22
70-79	5	10
80-89	1	2
Race		
Hispanic	37	74
African American	7	14
non-Hispanic White	6	12
Asian	0	0

Data Collection

Objective 1: improved management system. In order to assess whether the DM flow sheet was utilized, EMRs were reviewed and a flow sheet was considered “used” if it was filled out (even partially) and uploaded into the EMR. To determine if the color folder system was utilized, the EMR was reviewed and the color folder was considered “used” if the box indicating “Green Folder and Flow Sheet Provided” was checked.

Objective 2: improved staff and provider knowledge. In order to assess improved knowledge a test (see Appendix E) was administered and pre- and post-intervention means were compared. In order to assess the base knowledge of the MAs and providers regarding the ADA DM guidelines, the DNP student issued the instrument (see Appendix E) prior to providing any information on the recommended components of the ADA DM guidelines. At the completion of the 2 week training sessions, in order to assess improved knowledge the same test was re-issued and the pre and post-orientation mean scores were compared.

Objective 3: improved adherence to DM guideline. In order to assess improved behavior chart audits were conducted. The data needed to be collected in two different phases. First a baseline (pre-intervention) evaluation was done and after the intervention the second (post intervention) evaluation was done. The baseline data collection was obtained from 50 medical records prior to the QI intervention in late June 2016, and compiled into a spreadsheet. The data collected focused on 14 behaviors. Those behaviors were:

- whether the provider made referrals to ophthalmologists,
- whether the provider made referrals to podiatrists,
- whether the provider made referrals to DSME,
- whether the provider submitted lab orders for urine microalbumin testing.
- whether the provider inspected patient feet
- whether the MA documented an HA1C
- whether the provider treated for hypertension as indicated
- whether the MA documented BMI
- whether the MA documented random blood sugar
- whether the MA documented if the patient has a functional glucometer
- if the provider treated for hypoglycemia as indicated
- if the provider treated for hyperlipidemia as indicated
- if the provider recommended aspirin therapy as indicated
- and if the MA used and uploaded the DM flow sheet into the EMR

Post-intervention data were collected after implementation of the process change from 50 medical records of patients seen in the clinic after the initiation of the project procedures, and were reviewed for the above behaviors.

All data were collected from medical records, with the exception of the mean scores, which were collected from tests administered to staff. Basic demographic factors for each patient were also gathered from the EMRs, such as age, sex, and race. The data collection did not require the DNP student to gather any data directly from the patients. Therefore no consent forms were necessary. Further all data collected was de-identified, and only aggregate data were reported.

Data Analysis

During data collection the DNP student kept track of the data collected from the EMRs on a spreadsheet. Upon completion of data collection, the DNP student entered the aggregate figures from the chart reviews into the IBM SPSS Statistics 22 (student version). The SPSS software was then used to analyze the data and to determine the differences by comparing percent change between the pre-intervention and post- QI intervention. Additionally, mean knowledge score of MAs and providers were compared pre-intervention and post-intervention. These scores were entered into a spreadsheet and the mean was calculated using the spreadsheet software.

Timeline

The development of a timeline was essential during the quality improvement project. A timeline helped predict when the work should have been completed, and it organized and kept the work in a consistent sequence as well as keeping the stakeholders up-to-date of the project's progress (see Appendix I). In June 2016 four training sessions were held. Then data was extracted from 50 EMRs that met inclusion criteria. Then, the QI interventions were implemented from June 27, 2016 to September 05, 2016. During this time a color folder system

and a DM flow sheet were implemented as part of the DM care management system. After the intervention period a post intervention review of another 50 EMRs was conducted.

Protection of Human Subjects/Informed Consent

Currently, all employees at the Wellness Center must complete a Health Insurance Portability and Accountability Act (HIPAA) protocol-training program at the time of their employment. The HIPAA of 1996 is a federal legislation that was created in order to set national standards to “protect the privacy of patients' medical records and other personal health information” (U.S. Department of Health & Human Services, 2002). According to the Human Resources director, all of the study's staff participants completed the HIPAA protocol training and documentation of the training is included in each of the participant's employee files. This protocol maintains confidentiality of the patient demographic and health information and any data gathered about staff knowledge and behavior for the project.

The DNP student adhered to the three ethical principles: beneficence, justice, and respect for the person, during implementation of the project. The project only involved procedures that collected data from medical records, and data used to measure the MA's and provider's behavior components post training sessions by utilizing a “checklist” (see Appendix F). The data collection did not require the DNP student to collect data directly from the patient. Therefore, no consent forms were administered. All patient data were gathered from the medical record and the DM flow sheet, which is included in the medical record. Data collected were then de-identified, and only aggregate data reported. Data collected were compiled on a spread sheet including demographic characteristics, DM care indicators, and were used to determine rates of screening. These data were kept in a password-protected laptop that was kept in the DNP student's

possession. The Institution Review Board (IRB) determined that the procedures adequately protected the rights of patients, and therefore approved the application that was submitted.

Results and Findings

Outcomes

The aims of the project were threefold, 1) to implement a color folder system and a DM flow sheet as part of a DM care management system, 2) to improve the medical assistants' and providers' knowledge of the components of the recommended ADA DM guidelines through training sessions, 3) to improve the medical assistants' and providers' behaviors in accordance with the ADA DM guidelines through training sessions.

Objective 1: improved management system. To determine whether the staff was utilizing the color folder system and the DM flow sheet, the DNP student reviewed EMRs. Upon review of the 50 selected charts, the DNP student found that post-intervention 100% of the charts complied. All of the EMRs showed a box checked "Green Folder and Flow Sheet Provided" which indicated the MA used a green folder for the patient with DM. This success could be contributed to the training provided by the DNP and the fact that the MA could not exit the system without checking the box. All of the EMRs had a DM flow sheet uploaded in the system, and 48 of these were completely filled out; (one lacked a referral to DSME and the other lacked a laboratory order for a urine microalbumin). Because neither the color folder system nor the DM flow sheets were in use before the intervention, pre-intervention usage is assumed to be zero.

There was a demonstrated adherence to the use of the practice aids. The color folder sheet created no extra work for the MA handling reception, because previously the protocol required the MA to start a folder with forms for the patient; the only change was the color of the folder. The reminder in the computer system ensured that the green folder would be used consistently

and the MAs and providers expressed that the sight of the green folder put them on alert that the patient had DM and required a particular level of care. Implementation of these 2 practice aids was successful.

Objective 2: improved staff and provider knowledge. In order to assess improved knowledge the same knowledge test (Appendix E) was issued twice, once before any training was provided and once after. Then, the mean knowledge test score results for the components of the recommended ADA DM guidelines of medical assistants and providers were compared pre-intervention and post-intervention. The pre-intervention knowledge test revealed a mean of 75.36% with MAs demonstrating lower scores than providers. Post-intervention mean score was 100%. A 24.64% improvement in knowledge level for both providers and MAs was demonstrated.

Because there was an increased understanding of the components of the recommended ADA guidelines, the MAs and providers understood the importance of their roles and responsibilities. They also understood the importance of the guidelines in providing quality care to patients with DM, and this translated to behaviors evidenced in Objective 3, namely adherence to DM guidelines in the everyday primary care of patients with DM.

Objective 3: improved adherence to DM guidelines. The measure the DNP student used to assess the MAs and providers' behavior according to their responsibilities was a checklist (see Appendix F) that was developed by the DNP student. The DNP conducted pre and post intervention EMR chart audits to determine if the required behaviors were adhered to. Although the checklist had many indicators listed, for the purposes of this QI project, 14 behaviors as listed in previous section and in Table 4 were tracked. In order to assess improved behavior the DNP student then compared the pre and post intervention data. Documentation of these DM

management practices indicated the practice was adherent with current evidence-based guidelines, an indicator of quality care, and also suggested the success of the education provided pre-intervention.

Table 4

Pre-and Post-intervention Data for Adherence to Diabetes Guidelines

Category	Pre-intervention %	Post-intervention %	% Change
Podiatry referral	60	100	67
Ophthalmology referral	48	100	108
DSME referral	10	98	880
Lab Order for Urine Microalbumin	24	98	308
Foot inspection	0	100	1000
Documented HA1C	88	100	14
Hypertension treatment	50	86	72
Documented BMI	100	100	0
Documented random blood sugar	94	98	4
Glucometer	0	100	1000
Hypoglycemia treatment	86	100	16
Hyperlipidemia treatment	70	92	31
Aspirin therapy	36	84	133
Use of DM Flow Sheet	N/A	100	1000

Discussion

Adherence to the ADA standards of medical care is a major factor in achieving quality care for patients with DM. The guidelines offer providers with the components of DM care, treatment goals and tools to evaluate the quality of care. This quality improvement project reinforced the importance of provider adherence to the ADA standards in a small clinic that had identified deficiencies in meeting these guidelines. Where interventions were made to promote adherence, there was a demonstrated increase in staff adherence to several of the recommended guidelines. Furthermore, the number of referrals to ophthalmologist increased from 48% to 100%, podiatry from 60% to 100%, DSME from 10% to 98%, microalbumin screening from 24% to 98%, and inspection of patient feet from 0% to 100%. Nine other quality improvement indicators were also significantly improved.

Although the importance of adherence to recommended guidelines is widely recognized, studies have shown that health care providers continue to fail to follow the guidelines when caring for patients with DM (Pastel et al., 2009). For instance, the CDC found that, despite the recommended guidelines for adults with DM, 35% did not receive necessary referrals for eye exams, 28.8% did not receive a foot examination, and 42.4% did not attend a DSME class (CDC, 2014). This DNP student's needs assessment, reflected the national trend, and found that the recommended guidelines were not being properly applied at the WC, and the DNP student recognized an opportunity for improvement.

Numerous studies in health care literature support the role of DM flow sheets in improving provider adherence to the recommended guidelines. For example, the Hahn et. al. (2008) study found that where a DM flow sheet was utilized there was a better rate of adherence to guidelines. Similarly, this QI project saw an increase in adherence to guidelines where a DM

flow sheet was utilized. This project assessed rates of referrals, screenings, documentation, and appropriate treatment of comorbidities. All of the indicators were improved once diabetic patients were clearly identified to the provider and a practice aid, i.e. the DM flow sheet, included for them to easily access and use. The DM flow sheet was filled out by hand and later scanned and uploaded into the EMR; this made it user-friendly because the MA and providers did not need training to use a new software to fill out the DM flow sheet.

Unlike the study by Hahn et. al. (2008), which noted lack of training as a limitation, this DNP student provided all of the staff with 2 hours of appropriate training regarding the guidelines and expected roles and responsibilities. Further, throughout the study this DNP student was available to answer questions and provide guidance and feedback regarding the QI procedures. By the end of the intervention period the staff shared that they were relying less on the training handouts, and instead the behaviors were becoming second nature when treating a patient with DM.

Additionally, the benefits of using a DM flow sheet can extend beyond the medical care improvements. Pastel et al. (2009) found that the use of flow charts can free up the providers to spend more time addressing the patient's care. Similarly, our medical providers expressed that the use of the DM flow sheet streamlined their time with the patients. By the time the provider was in the room with the patient the MA already looked up past referrals, and if they determined a referral had not been made the appropriate form was placed in the green folder. That way, when the provider was with the patient all they had to do was fill out the appropriate forms and care for the patient, instead of tracking down an MA to look up a referral or get a referral form. Unfortunately, the MAs who took on most of the responsibility for filling out the flow sheet did not experience the same time-saving benefit. The MAs shared that looking up referrals was

arduous and time consuming, nearly doubling the standard visit time from 15 minutes in the exam room to almost thirty. However, similar to the LNAs in Pastel et al. (2009) the MA's felt they played a more active role of the medical care the patients received and felt more confident in their care of patients with DM. Further, in the future it will serve to save time; because once the referrals were located the MA recorded them on the flow sheet, or recorded any referrals the provider made at that visit. That flow sheet, and the information on it, will then be easily accessible at future visits.

Another useful tool was the practice aid reminder, which served as a visual cue to providers to perform an activity. A recent study by Umar-Kumara & Tufts (2011) utilized multiple practice aids, such as a foot sticker to remind the provider to conduct a foot exam and a foot sign to remind patients to remove their shoes. These visual reminders led to an increase in the rate of foot screenings completed. Similarly, the color folder system in this QI project served as a visual reminder for the MAs and providers to initiate the sequences of care necessary when caring for a patient with DM. Previously these behaviors might not have even been triggered, because the MA or provider might not have recognized the patient as a patient with DM. This system proved very successful as evidenced by the presence of a completed DM flow sheet in every EMR and the increased adherence to the guidelines.

This entire intervention was of little to no cost to the WC, because the DNP student volunteered her time to conduct the necessary training and to collect and analyze data. There were small costs associated with printing training materials, flow sheets, making copies, and purchasing green folders. However, the costs were absorbed by the clinics overhead budget, which already included printing, copying, and purchasing office materials.

The providers were very enthusiastic and helpful during this QI project. Due to the Health Springs Center for Medicare and Medicaid quality reports they receive quarterly, they were already aware of some of the shortcomings in the clinic. However, providers did not realize the full extent of the issues until the DNP conducted the needs assessment. It is too soon to tell if the intervention will have an impact on Health Spring Center for Medicare and Medicaid quality indicators, a central payer at the clinic. Health Springs monitors for compliance with recommended guidelines for various chronic conditions, such as DM. By examining the clinic's billings, Health Springs determines if the clinic has been complying with the guidelines. For example, if insurance has not been billed for a podiatry visit they can assume that the primary care provider has not referred the patient. This compliance is tied directly to reimbursement, and therefore greater adherence equates to greater reimbursement. Therefore, the DNP student anticipates that there will be an increase in reimbursement rate due to the clinic being in compliance with most of the recommendations

Implication for practice

The findings of this QI project indicate that the use of practice aids and training, specifically the DM flow sheet and color folder system can improve provider adherence to the ADA standards of care DM guidelines as evidenced by the increased rates of referrals, increased screenings, more thorough documentation, and appropriate treatment of comorbidities. Although this QI project was specific to patients with DM, there is indication that similar projects could be successfully applied to other chronic illnesses, such as hypertension and coronary artery disease. This intervention was implemented at a small primary care clinic, but with some adaptation this intervention could be adopted by practices on a larger scale.

This project has the potential to address healthcare disparities in DM care. The demographic profile indicates there is a large percentage (72%) of Hispanic patients. This ethnic minority population could benefit from improvements in DM care because they have poor DM care outcomes compared to other populations such as non-Hispanic whites. This population normally seek healthcare in primary care settings and therefore future studies are needed to determine if cultural tailoring of QI DM interventions will provide quality benefits versus those of the standard QI interventions (Umar-Kamara & Tufts, 2013). In this QI project, the practice aids were intended for the staff, and therefore were in English. Exploring the needs of patients who primarily speak Spanish, when they follow through on referrals or seek DMSE, including the barriers to appointment seeking and access to care, would be a productive next step in extending the care that the WC provides.

Limitations

Being that the WC is a small primary care office, the sample utilized was small. Such a small sample group gives the interventions a lower applicability in the analysis. Replication of this study with a similar design but utilized in more than one general practice health clinic would increase the applicability of results. Another very important limitation of the study was the additional time required in order to complete the flow sheet and adhere to all the standards of care. The flow sheet is not complicated to follow however; it does slow the clinic's patient flow. In order to determine whether the patient needs a referral the MA must review the EMR to determine the last referral date. If a referral is made it must be noted in the physical copy, and then later updated in the EMR. This process is made even slower because the MAs do not have access to the EMRs quickly due to a small amount of computers. These were all tasks that had previously been inconsistently performed by MAs, and often these tasks were the first ones

abandoned due to the pressures of time. The flow sheet, however, made the MAs more accountable to completing these tasks and therefore increased the time spent at the computer. Adherence in the guidelines increased the time the provider spent with patients. However this extra time is valuable in improving patient care and the patient health outcomes. Further, provider attention to referrals and screening, does contribute to increased reimbursement.

Another limitation of the study is that the time frame for implementation was limited. While the results were promising, and the staff was enthusiastic, this QI project was intended to effect permanent changes in the care management system and increase adherence to the standards of care. However, for the intervention to be feasible long term the process might need to be adjusted to save time. If an adjustment does not take place, the staff's enthusiasm might decrease. Alternatively, staff may become more proficient and find that adhering to standards does not take an excess amount of time, and that the time spent is worth the patient health benefits. A more detailed time and motion study could reveal the costs of the longer process.

Although the increase in referrals was important for the care of chronic conditions such as DM, the time spent by the MA looking up referrals increased the time the patients spent inside the clinic by about 10 minutes. Pre-intervention, about 15 minutes were allocated per patient for the clinic's intake process. Post intervention for the MAs and providers to adhere to all standards of care took at least 30 minutes. This has the potential to double the patient's visit time. This additional delay might dissuade patients from attending their scheduled clinic visits. Therefore, it would be imperative to improve the length of time the process takes. Future research to consider if there is a different flow sheet and or practice aid that allows for a quicker consult, without sacrificing quality of care would be warranted.

Patient demographic characteristics of this sample were also limited. All of the patients were over 50 years of age, and 72% of the sample patients were Hispanic. Although the sample of the study was reflective of the community in which it was located, because of the lack of variation the generalizability of the results of this study might be viewed as limited to communities with similar demographics. It's difficult to say whether the demographics of the sample influenced the outcome in any way. In order for this study to be more generalizable the sample demographics should be more diverse, and this might provide a different perspective.

One final limitation was that the focus of this study was on the referrals being issued. Follow-up of whether the patient actually kept the referral appointment was not possible. Because the referrals were made to specialists, often the appointments were made more than a month out, and the DNP student could not get a full assessment of referral appointments kept. Therefore while the process of care was improved, there is no evidence as to whether the patient outcomes were improved.

Sustainability Activities

In order for the intervention to be sustainable long term, the process would need to be revised in order to reduce the amount of time it takes. One recommendation is to take several flow sheets and compare the speed of consultation, to analyze the flow sheet that does not affect patient clinic flow. Further, it is recommended that future studies examine the utilization of a flow sheet for other chronic conditions such as hypertension and coronary artery disease and their effectiveness.

To sustain these interventions, incoming providers and medical assistants would need to be trained on adherence to ADA DM guidelines. The same education that was implemented in this study could be integrated during the training process for incoming staff in order to insure

that all new members have the requisite knowledge and understand the expectations to meet the standards of care. The training for incoming staff currently consists of one-on-one training of the member, but there is currently no written staff or policy manual. A manual that integrates the materials used in the training provided by the DNP student would be essential.

Another recommendation is to develop a separate IT system for the WC. Currently the electronic information for the WC is housed on the database of the larger clinic, which makes it difficult to separate the WC patients from the patients of the whole clinic. Alternatively, the current system could be improved in such a way that would allow the data from the individual clinics to be separated, but yet still accessible to both clinics in order to compare and examine.

APRN Role

The DNP student played a pivotal role in the interdisciplinary team's adoption of a quality improvement initiative. The DNP's education allowed her to identify a set of clinical problems within the microsystem and to create solutions to those problems that will in turn decrease health disparities, improve health outcomes and ensure excellence in practice. The education that the DNP received enables her to translate research to best serve the needs of diabetic patients, the target population of this project, and the community at large. According to the American Association of Colleges of Nursing (AACN, 2015) there are eight DNP Essentials, and when these essentials are combined with principles of nursing scholarship, then DNP practice-scholarship can be achieved. By striking the balance between practice and scholarship, graduates are better prepared to improve health outcomes (AACN, 2015). Not only is the graduate equipped with the practical leadership skills as evidenced in this project, but she demonstrated the knowledge about quality improvement processes and how to translate evidence into practice (AACN, 2015). The application of these skills resulted in demonstrated

improvements within the primary care setting, the care sphere within which nurse practitioners practice.

In particular, AACN Essential VI: *Interprofessional Collaboration for Improving Patient and Population Health Outcomes* prepared the DNP graduate with “methods of effective team leadership”... preparing her “to play a central role in establishing interprofessional teams, participating in the work of the team, and assuming leadership of the team when appropriate” (AACN, 2006). The role of the DNP was to utilize this particular essential in order to achieve “the Institute of Medicine (IOM) mandate for safe, timely, effective, efficient, equitable, and patient-centered care in a complex environment, healthcare professionals must function as highly collaborative teams” (AACN, 2006). In addition, the DNP student led the interdisciplinary team through the analysis of the complex practice and identified any issues within the WC, utilized effective communication and collaborative skills during the development and implementation of the QI project. The DNP student also utilized consultative and leadership skills with the interdisciplinary team in order to create a positive “change in health care and complex healthcare delivery systems” (AACN, 2006).

The DNP student used the knowledge required to perform a needs assessment that identified a gap in the level of recommended care, and implemented a program according to the needs of the clinic. The DNP student was also able to identify the stakeholders in the WC and examine the threats and barriers to the plan. Further, the DNP student had the critical knowledge of the community and its cultural diversity and psychological dimensions that allowed her to perform an analysis, develop, and implement appropriate interventions. Finally, the DNP student was able to gather, evaluate and analyze the data to determine that the interventions implemented were successful.

Conclusion

The findings presented in this report show that the use of practice aids can improve the extent to which patients with DM receive the recommended referrals and screenings. Primary care providers are in a position to implement these practice aids for the treatment of chronic conditions such as DM, mainly because most patients receive the majority of their care in the primary care setting. The rapport and the reassurance patient receive allows for a larger number of patients to receive educational and preventative DM services. Therefore, the key to diminishing the gaps in the treatment of DM is to have family nurse practitioners and primary care providers get involved and intervene to improve the care offered to this population. The outcomes of this intervention show that it possible to successfully increase provider adherence to ADA guidelines for DM management. The results assert that the use of practice aids such a diabetic flow sheet can improve the quality of care a patient with DM receives by ensuring adherence to evidence based care. Adherence to the guidelines can affect not only the processes of care, but also the patient outcomes and their self-care abilities. When providers adhere to the ADA DM guidelines and make the appropriate referral screenings to ophthalmologist, podiatrist, DM self-management education, and urine microalbumin, it is the patient that benefits. Further, adherence to the guidelines could decrease not only the suffering, or potential future suffering, associated with the disease, but also the cost of care.

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Appendices

Appendix A

Questionnaire (Toobert, Hampson, & Glasgow, 2000)

The Summary of Diabetes Self- Care Activities *

The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

Diet How many of the last SEVEN DAYS have you followed a healthful eating plan? 0 1 2 3 4 5 6 7	On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work? 0 1 2 3 4 5 6 7	Smoking Have you smoked a cigarette—even one puff—during the past SEVEN DAYS? 0. No 1. Yes. If yes, how many cigarettes did you smoke on an average day? Number of cigarettes:
On average, over the past month, how many DAYS PER WEEK have you followed your eating plan? 0 1 2 3 4 5 6 7	Blood Sugar Testing On how many of the last SEVEN DAYS did you test your blood sugar? 0 1 2 3 4 5 6 7	
On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables? 0 1 2 3 4 5 6 7	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider? 0 1 2 3 4 5 6 7	
On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy products? 0 1 2 3 4 5 6 7	Foot Care On how many of the last SEVEN DAYS did you check your feet? 0 1 2 3 4 5 6 7	
Exercise On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking). 0 1 2 3 4 5 6 7	On how many of the last SEVEN DAYS did you inspect the inside of your shoes? 0 1 2 3 4 5 6 7	
Additional Items for the Expanded Version of the Summary of Diabetes Self-Care Activities.		
Self-Care Recommendations 1A. Which of the following has your health care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please check all that apply: <input type="checkbox"/> a. Follow a low-fat eating plan <input type="checkbox"/> b. Follow a complex carbohydrate diet <input type="checkbox"/> c. Reduce the number of	2A. Which of the following has your health care team (doctor, nurse, dietitian or diabetes educator) advised you to do? Please check all that apply: <input type="checkbox"/> a. Get low level exercise (such as walking) on a daily basis. <input type="checkbox"/> b. Exercise continuously for a least 20 minutes at least 3 times a week.	3A. Which of the following has your health care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please check all that apply: <input type="checkbox"/> a. Test your blood sugar using a drop of blood from your finger and a color chart. <input type="checkbox"/> b. Test your blood sugar using a machine to read the results.

calories you eat to lose weight _ d. Eat lots of food high in dietary fiber _ e. Eat lots (at least 5 servings per day) of fruits and vegetables _ f. Eat very few sweets (for example: desserts, non-diet sodas, candy bars) _ g. Other (specify): _ h. I have not been given any advice about my diet by my health care team.	_ c. Fit exercise into your daily routine (for example, take stairs instead of elevators, park a block away and walk, etc.) _ d. Engage in a specific amount, type, duration and level of exercise. _ e. Other (specify): _ f. I have not been given any advice about exercise by my health care team.	_ c. Test your urine for sugar. _ d. Other (specify): _ e. I have not been given any advice either about testing my blood or urine sugar level by my health care team.
4A. Which of the following medications for your diabetes has your doctor prescribed? Please check all that apply. _ a. An insulin shot 1 or 2 times a day. _ b. An insulin shot 3 or more times a day. _ c. Diabetes pills to control my blood sugar level. _ d. Other (specify): _ e. I have not been prescribed either insulin or pills for my diabetes.	Diet 5A. On how many of the last SEVEN DAYS did you space carbohydrates evenly through the day? 0 1 2 3 4 5 6 7	Medications 6A. On how many of the last SEVEN DAYS, did you take your recommended diabetes medication? 0 1 2 3 4 5 6 7 OR 7A. On how many of the last SEVEN DAYS did you take your recommended insulin injections? 0 1 2 3 4 5 6 7
8A. On how many of the last SEVEN DAYS did you take your recommended number of diabetes pills? 0 1 2 3 4 5 6 7	Foot Care 9A. On how many of the last SEVEN DAYS did you wash your feet? 0 1 2 3 4 5 6 7	10A. On how many of the last SEVEN DAYS did you soak your feet? 0 1 2 3 4 5 6 7
11A. On how many of the last SEVEN DAYS did you dry between your toes after washing? 0 1 2 3 4 5 6 7	12A. At your last doctor's visit, did anyone ask about your smoking status? 0 yes 1 no	13A. If you smoke, at your last doctor's visit, did anyone counsel you about stopping smoking or offer to refer you to a stop-smoking program? 0. No 1. Yes 2. Do not smoke.
14A. When did you last smoke a cigarette? _ More than two years ago, or never smoked _ One to two years ago _ Four to twelve months ago _ One to three months ago _ Within the last month _ Today		

Scoring Instructions for the Summary of Diabetes Self-Care Activities

Scores are calculated for each of the five regimen areas assessed by the SDSCA: Diet, Exercise, Blood-Glucose Testing, Foot-Care, and Smoking Status.

Step 1:

For items 1–10, use the number of days per week on a scale of 0–7. Note that this response scale will not allow for direct comparison with the percentages provided in Table 1.

Step 2: Scoring Scales

General Diet = Mean number of days for items 1 and 2.

Specific Diet = Mean number of days for items 3, and 4, reversing item 4

(0=7, 1=6, 2=5, 3=4, 4=3, 5=2, 6=1, 7=0). Given the *low inter-item correlations for this scale*, using the individual items is recommended.

Exercise = Mean number of days for items 5 and 6.

Blood-Glucose Testing = Mean number of days for items 7 and 8.

Foot-Care = Mean number of days for items 9 and 10.

Smoking Status = Item 11 (0 = nonsmoker, 1 = smoker), and number of cigarettes smoked per day.

Scoring for Additional Items

Recommended regimen = Items 1A - 4A, and items 12A - 14A, no scoring required.

Diet = Use total number of days for item 5A.

Medications = Use item 6A - OR - 7A AND 8A, use total number of days for item 6A, use mean number of days if both 7A and 8A are applicable.

Foot-Care = Mean number of days for items 9A - 11A, after reversing 10A and including items 9 and 10 from the brief version.

* Toobert et al. *The Summary of Diabetes Self-Care Activities Measure*. Diabetes Care, 23(7) July 2000: 943-950.

Appendix B Diabetes Flow Sheet



Diabetes Care Guidelines Flow Sheet

Patient name: _____ ID#: _____

Date of birth: ____ / ____ / ____ Date DM of Diagnosis: ____ / ____ / ____ Type: I or II (Circle one).

Language: _____ Ethnicity: _____

EACH VISIT

Wt: _____ Vital Signs B/P: _____ HR: _____ T: _____ R: _____ BMI: _____

Random Glucose: _____ Hemoglobin A1C: _____ (Goal <7%).

Functional Glucometer: Yes/No Strips: Yes/No Lancets: Yes/No.

Foot examination: Normal/Abnormal Results: _____

Skin examination: (Circle all that apply) abscess, acanthosis, cellulitis,
fungal rash, skin tags, open wounds, & other rashes.

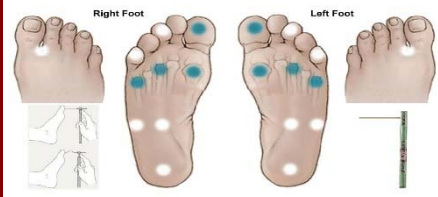
Location: _____

ANNUAL EXAM

Microalbuminuria: _____

Dilated Eye Exam: _____

Foot exam: (Circle Area of finding)



Diabetic Self-Management Education (DSME): Yes/No (Circle all that apply) Diet/Exercise/ Wt loss Monitoring.

REFERRALS

Eye doctor referral date: ____ / ____ / ____ Outcome: _____

Podiatrist referral date: ____ / ____ / ____ Outcome: _____

DSME referral date: ____ / ____ / ____ Outcome: _____

Inscriber Name: _____

Today's Date: _____

Appendix C
Recommended Components for the ADA Diabetes Guidelines (ADA, 2016)

Recommended Components for the ADA Diabetes Guidelines

- Annual referral to an ophthalmologist for a dilated retina exam, and to a podiatrist for a comprehensive microfilament foot exam.
- An annual referral to DSME for assessment of nutrition, education, and emotional needs, and at the time of diagnosis; as well as when an unexpected complicating factor develops; or when changes in the care occur.
- Annual urine microalbumin test to detect presence of albumin, an early indicator for kidney damage.
- ***Other components***
 - Inspection of feet documented on the EMR on every routine visit
 - HA1C measurements
 - Blood pressure measurements
 - Patients with a diagnosis of hypertension need to be on a antihypertensive agent if not contraindicated
 - Basic metabolic index (BMI) obtained on every visit and discussed with the patient
 - Random blood glucose check on every routine visit
 - Functional glucometer check on every routine visit
 - If patient has a diagnosis of DM, determine if on a hypoglycemic agent
 - If patient has a diagnosis of hyperlipidemia, determine if on a statin
 - If patient is at risk for atherosclerotic cardiovascular disease (ASCVD), determine if patient is on aspirin if not contraindicated
- Diabetes flow sheet must be in all the medical records for patients with diabetes

Appendix D Roles and Responsibilities

Medical Assistant's Roles and Responsibilities' for the Recommended Components of the ADA Diabetes Guidelines

Color Folder System

The MA will recognize that the “***green folder***” will require a particular level of care because the green folder indicates that the patient, is a patient with diabetes.

Referrals

Determine if a referral form needs to be placed in the “green folder” by reviewing the patient’s EMR. If the patient does not have a consultation report from an ophthalmologist for a ***dilated retina exam***, and from a podiatrist for a ***comprehensive microfilament foot exam*** in the previous 12 months, then the MA will place referral form in the green folder for provider to sign.

Determine if a referral form needs to be placed in the “green folder” by reviewing the patient’s EMR. If the patient does not have a consultation report from a ***DSME*** program in the previous 12 months, then MA will place referral form in the green folder for provider to sign.

Laboratory Order Forms

Determine if patient has had an annual urine ***microalbumin test*** by reviewing the patient’s EMR. If patient does not have a documented microalbumin test documented in the previous 12 months, then the MA will place a laboratory order form in the green folder for provider to sign.

Other components

- Aside from the standard vital signs, (**BMI** is automatically determined by the EMR system once the vital signs have been inserted into the EMR) the MA will perform a **random blood sugar** on every patient with diabetes and write it on the designated place on the superbill with the rest of the vital signs, for the medical provider to see when he is reviewing the vital signs. The vital signs consist of **blood pressure measurements**, weight, oxygen level, temperature, respiration rate, and the pulse rate.
- **Place a paper mat on the floor** in front of where the patient is sitting and **assist patient to remove their shoes and socks** and **place their feet on the paper mat**. After the medical provider has inspected the patient's feet, then the MA will **document in the patient's EMR accordingly**.
- The medical assistant will ask the patient if they have a **functional glucometer**. If patient does not have a functional glucometer, the MA will document on the diabetes flow sheet for the medical provider to see.
- The MA will determine if laboratory order form for a **HA1C** needs to be placed in the green folder by reviewing in the patient's EMR if there has been a documented HA1C test done within the previous 12 months. If one has not been done, the MA will then place the laboratory order form in the green folder for the provider to sign and document the date of the last HA1C that was done including the results.
- The MA will **place a diabetes flow sheet** in the green folder on every routine visit for all patients with diabetes.
- The MA will also place any additional laboratory results or any other forms or information that needs to be reviewed by the medical provider in the green folder.

Medical Providers Roles and Responsibilities' for the Recommended Components of the ADA Diabetes Guidelines

Color Folder System

The medical provider will recognize that the “**green folder**” will require a particular level of care because the green folder indicates that the patient, is a patient with diabetes.

Referrals

The provider will sign any **referral form** if one is placed in the green folder to an ophthalmologist for a **dilated retina exam**, or to a podiatrist for a comprehensive **microfilament foot exam**. If a referral to **DSME** was placed in the green folder, this indicates that the MA verified for an annual DSME only. Aside from the annual referral to DSME, the medical provider will also refer the patient with diabetes at the time of diagnosis; as well as when an unexpected complicating factor develops; or when changes in the care occurs.

Laboratory Order Forms

The medical provider will sign any laboratory order form for a **microalbumin test** if placed in the green folder. The medical provider will also order a microalbumin test whenever necessary.

Other components

- The medical provider will **inspect the patient's feet on every routine visit**. The provider will also refer the patient to a podiatrist when there are abnormal findings that require an evaluation and/or treatment by a podiatrist. In addition, the provider will also provide the patient with a signed DME order form when the patient is in need of **diabetic shoes**.

- The medical provider will sign any laboratory order form for a **HA1C** if one is placed in the green folder. The medical provider will also order a HA1C whenever necessary.
- The provider will also review the patient's vital signs particularly the **blood pressure measurements** and the patient's **BMI**. The findings will be discussed with the patient. If the patient does not have a diagnosis of hypertension and meets criteria to diagnose the patient with hypertension, the provider will then initiate the patient with an antihypertensive agent as recommended by the ADA diabetes guidelines. The provider will also refer the patient to DSME according to the patient's BMI results as recommended by the ADA diabetes guidelines. In addition, the **random blood sugar** that was drawn by the MA will also be reviewed and discussed with the patient and will then provide the patient with a referral to a DSME program if necessary in addition to making any changes to the current treatment plan.
- The medical provider will review if a patient with a diagnosis of hypertension is on an **anti-hypertensive agent**, such as ACE inhibitor or an ARB agent or any other appropriate antihypertensive agent as recommended by the ADA diabetes guidelines. If not, the provider will then initiate the appropriate treatment as recommended by the ADA diabetes guidelines.
- The medical provider will provide the patient with diabetes with a **glucometer** along with a prescription for diabetic supplies, such as lances, test strips, and alcohol pads when the medical assistant has indicated that the patient does not have a functional glucometer. The provider will refer the patient to a home health agency for a skilled nurse to teach the patient how to use a glucometer.

- The medical provider will initiate treatment of a hypoglycemic agent if patient has a diagnosis of DM and is not on a **hypoglycemic agent**.
- If the patient has a diagnosis of hyperlipidemia, the provider will determine if patient is on a statin, if not, the provider will initiate the patient with **statin therapy** if not contraindicated.
- If the patient is at risk for atherosclerotic cardiovascular disease (ASCVD), the provider will determine if patient is on aspirin, if not, the provider will initiate the **aspirin therapy** if not contraindicated.
- The provider will “look” at the **diabetes flow sheet** on every routine visit regardless of what the chief complaint is, and will also look at the diabetes flow sheet to determine where the patient is in their treatment as well as their response to their treatment plus to determine if goals have been met. In addition, the provider will also verify if a diabetes flow sheet is in the green folder.
- The provider will sign any additional forms or discuss any laboratory results in addition to addressing any other information that is in the green folder.

Appendix E
Knowledge Test
Test for Components of the Recommended ADA Diabetes Guidelines

1. According to the ADA, when should a patient with diabetes be referred to an ophthalmologist for a dilated retina exam and to a podiatrist for a comprehensive microfilament foot exam?

A. 3 months B. 6 months C. 12 months D. As needed only
2. According to the ADA, a patient with diabetes should receive an annual referral to DSME for assessment of nutrition, education, and emotional needs, and at the time of diagnosis; as well as when an unexpected complicating factor develops; or when changes in the care occur.

A. True B. False
3. According to the ADA, a patient with diabetes should receive an annual urine microalbumin test to detect presence of albumin, an early indicator for kidney damage.

A. True B. False

Other components

4. According to the ADA, when a patient with diabetes is receiving diabetes medical care in a clinic, the patient's feet should be inspected _____ and documented in the patient's medical record.

A. Once a month B. Every Three Months C. On Every Routine Visit D. Annually
5. According to the ADA, the HA1C goal set by the ADA is <7%, because a <7% HA1C has been proven to decrease complications of diabetes, such as reducing microvascular and neuropathic complications.

A. True B. False

6. According to the ADA, a patient's blood pressure measurement should be obtained on every routine visit.
- A. True B. False
7. The ADA recommends that the patient's systolic blood pressure should be less than 140mmHg, and those with values of about 120 mmHg should be counseled on lifestyle changes to reduce their blood pressure. The diastolic blood pressure should be less than 90 mmHg.
- A. True B. False
8. On a patient with diabetes, when is the basic metabolic index (BMI) obtained and discussed?
- A. Weekly B. Monthly C. On every routine visit D. Only when needed
9. If an individual has a diagnosis of DM, does the ADA recommend a hypoglycemic agent when not contraindicated?
- A. Yes B. No
10. If a patient has a diagnosis of hyperlipidemia, does the ADA recommend statin therapy when not contraindicated?
- A. Yes B. No
11. According to the ADA, when a patient with diabetes is at risk for atherosclerotic cardiovascular disease (ASCVD), it is recommended the patient should be on aspirin therapy when not contraindicated.
- A. True B. False

Appendix F
Skills Checklist for Medical Assistants and Medical Providers

**“Checklist” for Medical Assistant’s Roles and Responsibilities’ for the Recommended
Components of the ADA Diabetes Guidelines**

Color Folder System

- ☐ The MA recognizes the “***green folder***” requires a particular level of care for a patient with diabetes.

Referrals

- ☐ Determine if a referral form needs to be placed in the “green folder” by reviewing the patient’s EMR. If the patient does not have a consultation report from an ophthalmologist for a ***dilated retina exam***, and from a podiatrist for a ***comprehensive microfilament foot exam*** in the previous twelve months, then the MA places referral form in the green folder for provider to sign.
- ☐ Determine if a referral form needs to be placed in the “green folder” by reviewing the patient’s EMR. If the patient does not have a consultation report from a ***DSME*** program in the previous twelve months, then MA places referral form in the green folder for provider to sign.

Laboratory Order Forms

- ☐ Determine if patient has had an annual urine ***microalbumin test*** by reviewing the patient’s EMR. If patient does not have a documented microalbumin test documented in the previous twelve months, then the MA places a laboratory order form in the green folder for provider to sign.

Other components

- ☐ Aside from the standard vital signs, (***BMI*** is automatically determined by the EMR system once the vital signs have been inserted into the EMR) the MA performs a ***random blood sugar*** on every patient with diabetes and writes it on the designated place on the superbill with the rest of the vital signs, for the medical provider to see when he is reviewing the vital signs. The vital signs consist of ***blood pressure measurements***, weight, oxygen level, temperature, respiration rate, and the pulse rate.
- ☐ ***Places a paper mat on the floor*** in front of where the patient is sitting and ***assists patient to remove their shoes and socks*** and ***places their feet on the paper mat***. After the medical provider has inspected the patient's feet, then the MA ***documents in the patient's EMR accordingly***.
- ☐ The medical assistant asks the patient if they have a ***functional glucometer***. If patient does not have a functional glucometer, the MA documents on the diabetes flow sheet for the medical provider to see.
- ☐ The MA determines if laboratory order form for a ***HA1C*** needs to be placed in the green folder by reviewing in the patient's EMR if there has been a documented HA1C test done within the previous twelve months. If one has not been done, the MA then places the laboratory order form in the green folder for the provider to sign and document the date of the last HA1C that was done including the results.
- ☐ The MA ***places a diabetes flow sheet*** in the green folder on every routine visit for all patients with diabetes.
- ☐ The MA also places any additional laboratory results or any other forms or information that needs to be reviewed by the medical provider in the green folder.

**“Checklist” for Medical Providers Roles and Responsibilities’ for the Recommended
Components of the ADA Diabetes Guidelines**

Color Folder System

- ☐ The medical provider uses the “**green folder**” to provide diabetes-specific care.

Referrals

- ☐ The provider signs any **referral form** placed in the green folder to an ophthalmologist for a **dilated retina exam**, or to a podiatrist for a comprehensive **microfilament foot exam**.
Provider signs referral form for **DSME** if placed in the green folder, which indicates that the MA verified need for an annual DSME only. Aside from the annual referral to DSME, the medical provider also refers the patient with diabetes at the time of diagnosis; as well as when an unexpected complicating factor develops; or when changes in the care occurs.

Laboratory Order Forms

- ☐ The medical provider signs any laboratory order form for a **microalbumin test** if placed in the green folder. The medical provider orders a microalbumin test whenever necessary.

Other components

- ☐ The medical provider **inspects the patient’s feet on every routine visit**. The provider refers the patient to a podiatrist when there are abnormal findings that require an evaluation and/or treatment by a podiatrist. In addition, the provider also provides the patient with a signed DME order form when the patient needs **diabetic shoes**.

- ☐ The medical provider signs any laboratory order form for a **HA1C** if one is placed in the green folder. The medical provider also orders a HA1C whenever necessary.
- ☐ The provider also reviews the patient's vital signs particularly the **blood pressure measurements** and the patient's **BMI**.
- ☐ The provider discusses the findings of blood pressure measurements and BMI with the patient.
- ☐ If the patient does not have a diagnosis of hypertension and meets criteria to diagnose the patient with hypertension, the provider initiates the patient with an antihypertensive agent as recommended by the ADA diabetes guidelines.
- ☐ The provider also refers the patient to DSME according to the patient's BMI results as recommended by the ADA diabetes guidelines.
- ☐ The provider reviews and discusses with the patient the **random blood sugar** results drawn by the MA.
- ☐ The provider refers patient to a DSME program according to the results of the random blood sugar when necessary.
- ☐ The provider makes necessary changes to the current treatment plan as needed.
- ☐ The medical provider reviews if a patient with a diagnosis of hypertension is on an **anti-hypertensive agent**, such as ACE inhibitor or an ARB agent or any other appropriate antihypertensive agent as recommended by the ADA diabetes guidelines.

- ☐ If patient is not on an antihypertensive agent and has a diagnosis of hypertension, the provider initiates the appropriate treatment as recommended by the ADA diabetes guidelines.
- ☐ The medical provider provides the patient with diabetes with a **glucometer** along with a prescription for diabetic supplies, such as lances, test strips, and alcohol pads when the medical assistant indicates the patient does not have a functional glucometer.
- ☐ The provider refers the patient to a home health agency for a skilled nurse to teach the patient how to use a glucometer.
- ☐ The medical provider initiates treatment of a hypoglycemic agent if patient has a diagnosis of DM and is not on a **hypoglycemic agent**.
- ☐ If the patient has a diagnosis of hyperlipidemia, the provider determines if patient is on a statin.
- ☐ If patient is not on a statin and has a diagnosis of hyperlipidemia, the provider initiates the patient with **statin therapy** if not contraindicated.
- ☐ If the patient is at risk for atherosclerotic cardiovascular disease (ASCVD), the provider determines if patient is on aspirin.
- ☐ If the patient is not on aspirin therapy and at risk for ASCVD, the provider initiates the **aspirin therapy** if not contraindicated.
- ☐ The provider “looks” at the **diabetes flow sheet** on every routine visit regardless of what the chief complaint is, and determines where the patient is in their treatment, as well as their response to their treatment, plus determines if goals have been met.
- ☐ The provider verifies if a diabetes flow sheet is in the green folder.

- ☐ The provider signs any additional forms and/or discusses any laboratory results in addition to addressing any other information that is in the green folder.

Appendix G
LOGIC MODEL (W. K. Kellogg Foundation, 2004)

Project

Objective #1: By September 2016, a management system will be implemented at the WC to improve the provision of patient care and to, increase compliance and utilization of the ADA diabetes guidelines.

Resources	Activities/Inputs	Outputs	Outcomes		
In order to accomplish our set of activities, we will need the following	In order to address our problem, we will accomplish the following activities	We expect that once accomplished, these activities will produce the following evidence of service delivery	If accomplished, these activities will lead to the following short-term outcomes (<u> </u> years)	If accomplished, these activities will lead to the following intermediate outcomes (<u> </u> years)	If accomplished, these activities will lead to the following long-term outcomes (impacts)
Stakeholders Medical providers and medical assistants Material/Tools (Green Folder, spreadsheet, diabetes flow sheet, exam paper to place feet on, timeline)	Buy in from the stakeholders Participation from medical providers and medical assistants Develop the evidence-based tools. Implement folder-system Implement Diabetes Flow Chart Adhere to timeline.	The facilitation of a management system by the stakeholders and participation from the medical providers and medical assistants. Evidence-based tools introduced to clinic (diabetes flow sheet, green folder for color folder system). Sequence of activities occur according to timeline	Management system will adhere to the ADA diabetes guidelines. Utilization of evidence-based tools: flow chart and folder system by MAs and providers on all patients with diabetes routine visits.	All patients with DM receive screening and referrals according to ADA guidelines. Successful utilization of evidence-based tools and project planning will be complete in accordance to the GANTT timeline.	Improved patient behavior and patient outcomes.

Assumptions			External Factors		
Medical providers and medical assistants' readiness for project.			Resistance to project from stakeholders.		

LOGIC MODEL

Project Objective #2: By August 2016, MAs and providers will have improved knowledge in the application of current diabetes ADA management guidelines.

Resources	Activities/Inputs	Outputs	Outcomes		
In order to accomplish our set of activities, we will need the following	In order to address our problem, we will accomplish the following activities	We expect that once accomplished, these activities will produce the following evidence of service delivery	If accomplished, these activities will lead to the following short-term outcomes (<u> </u> years)	If accomplished, these activities will lead to the following intermediate outcomes (<u> </u> years)	If accomplished, these activities will lead to the following long-term outcomes (impacts)
<p>Stakeholders</p> <p>Medical providers and medical assistants</p> <p>Material/Tools (Green Folder, spreadsheet, diabetes flow sheet, exam paper to place feet on, timeline, a checklist prepared by the DNP student to provide knowledge and skills on the components of the recommended ADA diabetes guidelines that will be utilized by MAs and</p>	<p>The DNP student will provide a 30 minute training session twice a week for 2 weeks in the conference room of the WC to provide knowledge and skills as follows:</p> <p>.Knowledge of diabetes management components</p>	<p>Trained medical providers and medical assistants/healthcare team</p> <p>Evidence-based tools introduced to clinic (diabetes flow sheet, green folder for color folder system).</p> <p>Sequence of activities occur according to timeline</p>	<p>Trained healthcare team will acquire the <i>knowledge</i> on the recommended components of the ADA diabetes guidelines, diabetes, flow sheet, and color folder system through the training and education obtained from the sessions.</p> <p>Utilization of evidence-based tools: flow chart and folder system by MAs and providers on all patients with</p>	<p>Trained healthcare team will adopt the <i>behavior</i> to effectively utilize the diabetes flow sheet and the color folder system through the knowledge and skills obtained from the sessions.</p> <p>Successful utilization skills by MAs and providers of evidence-based tools and project planning will be complete in accordance to the GANTT timeline.</p>	<p>Improved patient behavior and patient outcomes.</p>

providers. Checklist will also be used to measure behavior.			diabetes routine visits.		
Assumptions Medical providers and medical assistants readiness for the quality improvement project			External Factors Resistance from stakeholders		

LOGIC MODEL

Project Objective #2: By September 2016, MAs and providers will have improved skill in the application of current diabetes ADA management guidelines.

Resources	Activities/Inputs	Outputs	Outcomes		
In order to accomplish our set of activities, we will need the following	In order to address our problem, we will accomplish the following activities	We expect that once accomplished, these activities will produce the following evidence of service delivery	If accomplished, these activities will lead to the following short-term outcomes (____ years)	If accomplished, these activities will lead to the following intermediate outcomes (____ years)	If accomplished, these activities will lead to the following long-term outcomes (impacts)
<p>Stakeholders</p> <p>Medical providers and medical assistants</p> <p>Material/Tools (Green Folder, spreadsheet, diabetes flow sheet, exam paper to place feet on, timeline, a checklist prepared by the DNP student to provide knowledge and skills on the components of the recommended ADA diabetes</p>	<p>The DNP student will provide a 30 minute training session twice a week for 2 weeks in the conference room of the WC to provide knowledge and skills as follows:</p> <p>a. Documentation in the EMR by MAs and providers of the following activities/components:</p> <ul style="list-style-type: none"> - Referral to an ophthalmologist, podiatrist, and DSME. -Ordering of urine microalbumin 	<p>Trained medical providers and medical assistants/healthcare team</p> <p>Evidence-based tools introduced to clinic (diabetes flow sheet, green folder for color folder system).</p> <p>Sequence of activities occur according to timeline</p>	<p>Trained healthcare team will acquire the <i>knowledge</i> on the recommended components of the ADA diabetes guidelines, diabetes, flow sheet, and color folder system through the training and education obtained from the sessions.</p> <p>Utilization of evidence-based tools: flow chart and folder system</p>	<p>Trained healthcare team will adopt the <i>behavior</i> to effectively utilize the diabetes flow sheet and the color folder system through the knowledge and skills obtained from the sessions.</p> <p>Successful utilization skills by MAs and providers of evidence-based tools and project planning will be complete in</p>	<p>Improved patient behavior and patient outcomes.</p>

<p>guidelines that will be utilized by MAs and providers. Checklist will also be used to measure behavior.</p>	<p>laboratory tests.</p> <ul style="list-style-type: none"> -Inspection of feet on each visit. b. EHR documentation of: <ul style="list-style-type: none"> -HA1C. -Blood pressure measurement. -Basic metabolic index (BMI) measurement. -Random blood sugar drawn. - A functional glucometer check. - Hyperlipidemia drugs (statins) review. - Aspirin prescribed if not contraindicated. -If hypertensive, ACE/ARB prescription reviewed. 		<p>by MAs and providers on all patients with diabetes routine visits.</p>	<p>accordance to the GANTT timeline.</p>	
<p>Assumptions</p> <p>Medical providers and medical assistants readiness for the quality improvement project</p>	<p>External Factors</p> <p>Resistance from stakeholders</p>				

Data Collection Spreadsheet

[illegible]

Data Collection

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Form

Variable #1: Referrals to ophthalmologist

Variable #2: Referrals to podiatrist

Variable #3: Referrals to DSME

Variable #4: Urine microalbumins tests that were done

Variable #5: Documentation of inspection of feet done on each visit

Variable #6: HA1C

Variable #7: Patients with a diagnosis of hypertension due to elevated blood pressures

Variable #8: Basic Metabolic Index (BMI)

Variable #9: Random blood sugar

Variable #10: Does patient have a functional glucometer

Variable #11: If patient is on a hypoglycemic agent

Variable #12: If patient with a diagnosis of hyperlipidemia, is patient on statin therapy

Variable #13: Is patient on aspirin therapy if patient is at increased risk for coronary artery disease (CAD)

Variable #14: Is there a diabetes flow sheet included in all of the diabetic medical charts

Appendix I Timeline

Activities	June				July				August				September				October				November			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Provide instructional sessions/2 classes				X	X																			
Review Charts				X	X																			
Data analysis				X	X																			
Implement tools						X	X	X	X															
2nd review of charts										X	X													
2nd Data analysis										X	X													
Evaluation Process													X	X	X	X	X	X	X	X				
Dissemination																					X	X	X	X