

2015

# Meaningful Use of Electronic Medical Recording to Improve Diabetic Treatment Compliance of American Diabetic Association Treatment Standards

Tamara Ann Parrish  
*Walden University*

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# Walden University

College of Health Sciences

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Tamara Parrish

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Review Committee

Dr. Patricia Schweickert, Committee Chairperson, Health Services Faculty

Dr. Amy Wilson, Committee Member, Health Services Faculty

Dr. Faisal Aboul-Enein, University Reviewer, Health Services Faculty

Chief Academic Officer

Eric Riedel, Ph.D.

Walden University

2015

Abstract

Meaningful Use of Electronic Medical Recording to Improve Diabetic Treatment

Compliance of American Diabetic Association Treatment Standards

by

Tamara. A. Parrish

MS, Vanderbilt University, 2002

BA, Albion College, 1999

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

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## Abstract

Diabetes affects approximately 10% of the American population with an annual expenditure of approximately \$174 billion dollars. The utilization of electronic medical records (EMR) combined with the meaningful use (MU) initiative may ensure that diabetic patients receive the recommended preventative care. Dorthea Orem's self-care deficit theory and the transtheoretical model of behavior change was utilized to design this quality improvement project. Medical professionals at a small private practice received education on American Diabetic Association (ADA) treatment standards and how to use the EMR system to track patients receiving the recommended diabetes care. The project question examined the effectiveness of provider education on improving ADA treatment standards and on using the EMR system to adhere to MU objectives of providing diabetic preventative care measures of annual dilated eye examinations, annual microalbumin levels, and annual microfilament foot examinations. A convenience sample of 3 providers and 309 patients was used and data were collected on Excel spreadsheets pre and post intervention through the Crystal Reports system to assess the percent improvement in the rates of preventative care. An impact evaluation revealed that the project achieved its objectives showing a 5.07% increase in diabetic preventative care. The program evaluation determined that the project is worth sustaining in the clinical setting as it provides a practical and economical way of improving diabetic patient care. This improvement project suggests that MU and adherence to ADA treatment standards has the potential to make a positive social change through increasing the amount of diabetic patients receiving preventative care.

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## Dedication

This paper is dedicated to the memory of Uncle Perlis Bryson, Jr., a man who personally knew the struggle with diabetes.

## Acknowledgments

I would like to thank all my family and friends for their support during the difficult journey of this quality improvement project.

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## Section 1: Nature of the Project

### **Introduction**

Diabetes affects 25.8 million Americans or approximately 10% of the general population (American Diabetic Association [ADA], 2013a). In addition, another 35% of the adult population in the United States has prediabetes and only around 7.3% are aware of the prediabetic state (ADA, 2013a). If diabetes continues to grow at the current rate, by 2050 one third of the population of the United States will have diabetes (ADA, 2013a). In 2007, the estimated annual expenditure on diabetes was \$174 billion in both direct and indirect costs (Centers for Disease Control and Prevention [CDC], 2012). Diabetes has been recognized as a disease of national significance by Healthy People 2020 (U.S. Department of Health and Human Services [DHHS], 2012) and of international significance by the World Health Organization (WHO; 2013). Both organizations have specific goals and objectives designed to reduce the number of diabetic patients and diabetes-related complications (DHHS, 2012; WHO, 2013).

Diabetes-related complications affect the quality of life of people with diabetes and accounts for a large portion of the money spent on diabetes care per year (CDC, 2012). Complications include, but are not limited to, lower limb ulcerations, coronary artery disease, peripheral neuropathy, nephropathy, retinopathy, blindness, myocardial infarctions, cerebral vascular accident, gingivitis, impotence, gastro-paresis, and lower limb amputations (ADA, 2013c). Prevention of these complications is essential in the reduction of diabetes expenditure annually (ADA, 2013c; Campbell & Hilleman, 2010; CDC, 2012; Zhang et al., 2009). The goal is that, through the reduction of complications,

the diabetic person's quality of life remains high, thus reducing the morbidity and mortality related to the disease state. Health care providers are encouraged to ensure that the patients with diabetes within their practice are receiving the standard of care, which includes participating in preventative measures (ADA, 2013b). Despite the recommendations from the ADA and the American Academy of Clinical Endocrinologist (AACE), low percentages of people with diabetes have been documented as having participated in preventative measures. For example, in 2010 only 50.1% of diabetic patients were reported as having received the recommended dilated eye examination (CDC, 2012).

The electronic medical recording (EMR) initiative was designed to help improve the quality of care that patients receive (Murphy, 2010). Despite the introduction of EMR into the medical setting, the percentages of diabetic patients receiving preventative care has remained low (CDC, 2012; Sperl-Hillen et al., 2010). EMR systems, if used to their full advantage, have features such as patient flowsheets, data tracking, and reminder systems that could be employed to help improve patient care (Murphy, 2010; Stetson, Ruggiero & Jack, 2010).

In an attempt to improve the quality of care given by health care providers, the MU initiative was enacted in 2009 (Hogan & Kissam, 2010). This initiative has the overriding goals of e-prescribing to reduce medication errors, improvement in the quality of health care, and the use of technology in a manner that improves patient health (Reilly & Polifroni, 2012; Swanson, Cowan & Blake, 2011). Some of the objectives of MU include the improvement in diabetic care (Ahmad & Tsang, 2013). Perceived barriers to MU

include the lack of time and lack of knowledge about the recommendations (McCluskey & Middleton, 2010).

Lack of time is an issue in primary care due to reimbursements going down forcing the time spent with patients to decrease (Parchman, Zeber, & Palmer, 2010). With less time to spend with patients, an efficient and effective system of ensuring diabetic patients receive the recommended preventative care is needed. The MU of EMR has the potential to make the largest impact on diabetes care (Ahmad & Tsang, 2013). First Medical Associates (FMA) (name has been changed to protect the identity of the practice) is a small private practice chosen for the improvement project because of the potential to benefit from the meaningful utilization of the current EMR system. Providers were educated about the use of EMR systems and on current ADA treatment standards in an attempt to improve diabetic care in a small private practice. An impact evaluation was used to determine the effect that provider education on current ADA treatment standards had on diabetes preventative care measures at FMA and how to track these standards through MU of the EMR system.

### **Problem Statement**

Diabetes is a rising epidemic in the United States and, with most of the diabetes care occurring in the primary care setting, it is important that primary care providers adhere to treatment standards (Gray et al., 2012; He, 2011). Part of the treatment standards for diabetes care includes preventative care measures in order to prevent or enable early detection of diabetic complications (ADA, 2013d). Preventative measures that primary care providers (PCP) should monitor include the following: annual eye



examination, annual micro-albumin levels, annual foot examination, daily self-monitoring of blood glucose levels, daily foot examinations, at least annual PCP visits, two A1C levels drawn annually for controlled diabetic patients and quarterly for uncontrolled diabetic patients, annual influenza vaccination, pneumococcal vaccination, and attendance at a diabetic educational class at least once (ADA, 2013d). Despite these recommendations, statistics released by the CDC indicate poor compliance with these standards.

FMA is a small family and internal medicine practice in Hendersonville, Tennessee. There are four providers in the practice with an estimated 2,300 patient base (based on a 3-year audit of active patient charts). Of these 2,300 patients, there were approximately 362 patients with diabetes at the time of this research. The current EMR system allowed for tracking of compliance with diabetic patient visits, foot examinations, referrals for diabetic eye exams, and percentage of patients who have received the recommended micro-albumin screening. FMA was below the national averages for preventative care, despite use of an EMR system. The question became if education and implementation of flowsheets and templates could improve the practice's averages.

MU is a core set of measures that Centers for Medicare Services (2013) established in order to provide incentives for medical practices to use EMR systems and use them in such a way as to track patient care and preventative services. The goals of the project were to encourage providers to utilize the existing tools such as flowsheets, reporting systems, disease state identifications, registries and other tools that exist in an EMR to identify patients who had not received recommended preventative services

(Hogan & Kissam, 2010). If providers were trained in the MU of the EMR system, then the quality of care should have improved (Fleurant et al., 2011; Koopman et al., 2011). Using the EMR system to track the implementation of ADA treatment standards holds the potential to greatly improve diabetes care (Cebul, Love, Jain, & Herbert, 2011). The research question examined was as follows: Will the implementation of provider education on use of the current EMR system at FMA and education on the 2013 ADA standards of diabetic care lead to improvement in diabetic care at FMA?

### **Purpose and Objectives**

The purpose of the project was to examine the effect of the MU of the EMR system on diabetes preventative care practices. The first objective of the project was to educate practice providers on the current ADA treatment standards. It was important that providers understand these standards prior to trying to implement MU. If providers were not aware of what the standards were and why they needed to abide by them, then they would be less likely to utilize them in clinical practice. The second objective of the project was to educate the practice providers on how to use the existing EMR system at FMA in a way consistent with the MU objectives concerning diabetes care. Within this objective were three smaller objectives: (a) teaching the providers about the diabetic flowsheet that is available, (b) how to use the EMR diabetic treatment template that is in the chart, and (c) how these two items interconnect to make documentation easier and provide a more comprehensive treatment picture. The third objective was then to monitor the utilization of these features as it related to improvement in the rates of preventative treatment measures within FMA.

Rates of improvement were examined through the collection of data centered on the 3 months prior to the intervention. The reporting system that was utilized within the EMR system examines what data the provider assesses. There are codes set up that allow tracking to determine if the patient has had the examination, if he or she has not had the examination, and if it is too early for the intervention. As long as the provider assessed the patient as to when the preventative measure was completed, and if they had not completed the measure and then the services were ordered, the data were captured. For example, if the patient in question had an eye examination 6 months prior and the provider asked about when the last dilated eye examination was and recorded it within the flowsheet, the provider received credit on the reports as having had the patient to complete the measure even though the complete measure would fall outside of the 3-month time frame. The preventative measures included the examination of the percentage of diabetic patient encounters that resulted in diabetic microalbumin screenings, foot examinations, and referrals for dilated eye examinations. These three preventative measures were set up to be tracked within the system. The objective was to first focus on these three interventions and if there was improvement in these rates to then expand to all preventative care measures. The interventions were implemented, and then 3 months later the same measures were examined to determine if any improvement resulted from the implementation of the intervention. The objective was that through education, providers would become comfortable with the ADA treatment standards and using the EMR in a meaningful way. At the end, an impact evaluation was implemented to determine the impact the project made on diabetes care at FMA.

### **Significance to Practice**

Diabetes is a significant health issue within the United States. The burden of care lies primarily in the PCP's office (Beaser & Brown, 2013). Providers need to ensure that the diabetic patient adheres to treatment standards and receives the recommended preventative screenings. While providers cannot make a patient go to scheduled appointments or receive care that he or she does not want, it is the responsibility of the provider to notify and help facilitate the recommended treatment measures (Gray et al., 2012). It is also the responsibility of the provider to be able to track the recommended services and document whether or not the patient has received the service and has been told what is needed. EMR systems allow providers to easily document and track treatment through templates and flowsheets (Berstein, 2007; Fleurant et al., 2011; Koopman et al., 2011). If the EMR system is used effectively, then diabetic care will improve and the rate of complications will go down as a result. Through the examination of how MU can impact diabetic care in a small private practice, it can help to illustrate that all PCPs can impact diabetic preventative care through use of EMR systems.

As health care legislation is passed concerning EMR systems and MU, it is important to examine the impact of MU within the primary care setting. This improvement project held the potential to support the legislation that the use of EMR can positively impact patient care. If no improvement was achieved it would have brought into question if MU is beneficial, or whether it is just added work as perceived by some providers (Palacio, Harrison, & Garet, 2007).

### **Project Question**

This program aimed to educate providers on current ADA treatment standards and the MU of the EMR system as it relates to diabetes care and determine whether it would improve diabetic treatment in a small private practice. If providers used these systems effectively, it should have improved the quality of care provided to patients. The project question was as follows: Will the implementation of provider education on use of the current EMR system at FMA and education on the 2013 ADA standards of diabetic care lead to improvement in diabetic care at FMA?

### **Evidenced based Significance of Project**

Diabetes affects approximately 10% of the population in the United States and is associated with increased morbidity and mortality (Gray et al., 2012). Uncontrolled diabetes leads to complications such as cardiovascular disease, lower limb amputation, retinopathy, nephropathy, neuropathy, peripheral vascular disease and gingivitis (ADA, 2013d; Traylor, Schmittiel, Uratsu, Mangione, & Subramanian, 2010). Medical professionals have recommended routine screenings for these complications as part of routine visits to the PCP's office (ADA, 2013d; Gray et al., 2012). It is the responsibility of the PCP to ensure that the patients are receiving the recommended care (ADA, 2013d). The American Diabetic Association (ADA; 2013b) has set forth evidence-based treatment recommendations that are updated annually (ADA, 2013b). Part of these recommendations are blood pressure under 130/80, LDL less than 100, compliance with ADA diet plan, exercise 5 out of 7 days a week, and an A1C level of less than 7% (ADA, 2013d). In addition, preventative care measure include annual dilated eye examinations,

daily self-monitoring of blood glucose levels, annual micro-albumin levels, annual foot examinations, daily self-foot examination, annual doctor's visits, at least two A1C levels drawn annually, annual dental examinations, annual influenza vaccinations, pneumococcal vaccination, and attendance at a diabetic educational class as least once (ADA, 2013d). The ADA has made these recommendations based on evidence that these preventative measures can help to prevent complications, or can aid in the early detection of complications. The goal in the early detection is to prevent progression of the complication and more serious complications (Campbell & Hilleman, 2010). Despite these recommendations, few patients with diabetes receive the recommended preventative care measures (DHHS, 2012).

According to a report issued in 2012 from the DHHS, 46 states reported statistics regarding the preventative care of diabetic patients. Only 62.8% of diabetic patients received the annual dilated eye exam, 63.6% reported daily blood glucose monitoring, 67.5% received annual foot examinations, and only 50% had received the recommended influenza vaccine (DHHS, 2012). Improvement in the preventative care measures is essential in order to reduce the rate of complications. Through reducing complications, the financial burden of diabetes can be reduced and the quality of life of the diabetic patients can improve (Gray et al., 2012).

In 2009 the American Recovery and Reinvestment Act was passed in an attempt to improve the use of EMR systems within the medical community (Fleurant et al., 2011). The objective was to provide incentive money for practices that attest to MU as a means of increasing the MU of EMR systems (Fleurant et al., 2011). MU mandates

established the need for patient reminder letters, tracking of patient specific data, patient educational handouts, and provision of patient visit summaries (Ahmad & Tsang, 2013; Hogan & Kissam, 2010). Medicine today is focused on providing evidence-based medical practices. Research is needed to show if MU provides improvement in practice. While the mandates have the potential to improve all patient care, the question remains if it can improve diabetic preventative care measures. Providing patients with reminders and educational materials has the potential to improve care. In addition, tracking diabetic care through flowsheets and templates will allow providers to have visual access to what care measures have been given and which care measures have not. Intense diabetes management, improvement in communication between patients and providers, and use of EMR reminder systems have been shown to be improve diabetic treatment care in larger practices (Fox, 2010; Marrero et al., 2013; Weber, Bloom, Pierdon, & Wood, 2007). The impact of MU and diabetes care in smaller practices needs to be examined more thoroughly.

### **Implications for Social Change**

The project held potential implications for a positive social change. One of the goals was the increase in preventative care measures, which has the potential to reduce the diabetes-related complications. Through reduction in complications, the financial burden of diabetes on health care will be reduced and people with diabetes will maintain a higher quality of life. Being able to maintain optimal health longer ensures that the diabetic patient will have the ability to participate in lifestyle modifications of diet and

exercise longer. By becoming a more active participant in his or her health, the diabetic person can maintain a controlled state of his or her diabetes.

Patients need reminders of preventative testing. Providers need reminding of which preventative testing is needed and if the patient has received the preventative testing or not. The use of templates reminded the providers of which preventative testing is needed. The use of flowsheets helped the provider to visualize which testing has been achieved and which testing has not. This allowed the providers to remind patients of the needed preventative testing. The goal was to encourage the diabetic patients to receive the testing. While the testing does account for health care expenditure, preventative testing is not as expensive as treatment for the complications associated with diabetes (Jacobs-Van der Bruggen et al., 2009).

The MU of an EMR system has the potential to create a social change. Through providing the PCP with tools needed to ensure a patient obtains preventative care measures, the diabetic patient receives improved health care and complication reduction. In addition, the goal is to keep the diabetic patient in optimal health and encourage the lifestyle modifications of diet and exercise. The diabetic patient could then serve as a role model or leader for other diabetic people and aid them in achieving treatment goals, complication prevention, and adherence to the ADA diet plan and recommended activity levels.



### **Definition of Terms**

*Diabetes* is defined as a disease state in which there is too much glucose in the blood stream. This is the effect of insulin resistance and diminished pancreatic function (ADA, 2013d).

*Pre-diabetes* is defined as a A1C level of 5.7%-6.4%. It is at this level that lifestyle modifications are strongly recommended (ADA, 2013a).

*A1C* is defined as a 3-month average of the blood glucose level. It is determined by examination of the percentage of hemoglobin in the red blood cell that has glucose bound to it (ADA, 2013d).

*Diabetic complications* are considered a health care issue that is related to or the result of uncontrolled diabetes (CDC, 2012).

*Retinopathy* is considered the damage to the retina as a result from uncontrolled diabetes. This can result in blindness (Zhang et al., 2009).

*Neuropathy* is the damage to the nerve bundles from elevated blood glucose levels (CDC, 2012).

*Nephropathy* is the damage to the kidneys from elevated blood glucose levels (ADA, 2013d).

*Peripheral vascular disease* is considered the blockage of arteries that extend to the lower extremities (ADA, 2013d).

*Microalbumin* is a microscopic protein found in the urine. It directly tracks damage to the kidneys related to diabetes (ADA, 2013d).

*Electronic medical recording (EMR)* refers to a computer system that is used for patient care purposes. All documentation concerning that patients health care and visit with the provider is documented with the EMR system (Berstein, 2007).

*Meaningful use (MU)* refers to using the EMR system in such a way that health care is improved such as using flowsheets and templates to track preventative care measures (Blumenthal & Tavenner, 2010).

*Flowsheet* refers to a spreadsheet of relevant clinical information concerning a patient (Koopman et al., 2011).

### **Assumptions and Limitations**

Currently the assumption was that MU is beneficial in all practices despite the size and location of the practice. MU is still in its beginning stages and not all practices have even adopted the MU objectives (Ahmad & Tsang, 2013). It was assumed that using the EMR system in a meaningful way would impact diabetic care in a small practice.

It was also believed that educating providers in the current treatment standards would improve diabetic care (Beaser & Brown, 2013). There are many factors that can influence the utilization of the education provided. Providers' attitudes towards diabetes, receptiveness to change, and perceived benefits can all influence whether or not the provider incorporates new information into practice (Markhorst, Martirosyan, Calsbeek, & Braspenning, 2012; Nam et al., 2011).

A third assumption was that the providers would be able to maintain the changes made in clinical practice. This was an item examined within the context of the project to some degree. It was assumed that the providers would be open to the change and would

work at making sure the changes were maintained. The limitations were that the providers could not be forced to make the changes, or to sustain the changes.

Overall limitations to the project included the inclusion of only one small practice. The practice was chosen due to convenience and willingness to participate in the project. The hope was that this project would serve as an inspiration for other small practices to adopt the MU of EMR systems in an attempt to improve diabetes preventative care. Another limitation was time constraints. Ideally the project would have examined data over a 12-month period of time looking at baseline data and data at 3, 6, and 9 and 12 months after the intervention to track continued improvement in preventative measures. The timeline for the implementation of the project was such that data would be collected at baseline and then again 3 months later.

Another limitation of this improvement project was the limited number of diabetic patients. The care of approximately 362 diabetic patients was examined. While the sample size may be typical of a small private practice, it did call into question the generalizability of the improvement project to a larger target audience.

### **Scope and Delimitations**

Diabetic patients were chosen for this project due to the rising epidemic of diabetes and the financial burden that it has created in health care. With the majority of diabetic patients receiving care at the PCP office, PCPs need to make sure that the proper care is given. One way practitioners have proposed to help improve the care of chronic health conditions was the MU initiative. MU is still relatively new, and researchers are still evaluating its impact on chronic health conditions. While larger clinics have

participated in studies concerning the incorporation of MU, smaller clinics have not been examined in such detail. Thus, diabetic patients within a small family and internal medicine practice were chosen for the project.

The project boundaries examined the impact on diabetic care in a small private practice. It examined the impact on the MU of the EMR system on diabetic preventative care measures within the practice. While the sample size was small, the goal was to demonstrate if MU had an impact on diabetic care within a small private practice. While the findings might not be generalizable to larger practices, the hope was that they can be generalized, or serve as a basis for smaller practices.

### **Summary**

Diabetes is a national epidemic and has been identified by Healthy People 2020 as a disease state that needs improvement (DHHS, 2012). Diabetes and diabetes-related complications represent billions of health care dollars spent annually and as the rate of diabetes grows this number will grow as well (ADA, 2013a; Ratner 2011). The goal is to increase compliance with diabetic treatment standards and improve compliance with preventative testing and treatment. Through the improvement of diabetic treatment and adherence to preventative testing, the rate of complications is expected to diminish. In order for providers to be able to remind patients of the preventative measure, EMR systems have been developed with tools such as flowsheets and templates. MU of EMR through utilization of the flowsheets and templates has the potential to provide improved diabetic care. While larger practice sites have been examined, small practice sites utilized as much for quality improvement projects. The goal of the project was to examine the

impact on adherence to diabetic preventative treatment standards in a small private practice after educating the providers on the use of templates and flowsheets.

## Section 2: Review of Literature and Theoretical and Conceptual Framework

### **Introduction**

With a significant number of diabetic patients receiving care from their primary care office, it is essential that providers understand the disease state and current evidence-based treatment standards. Diabetic patients can be difficult to manage and many find it difficult to communicate with providers (Beverly et al., 2012). The PCP is responsible for informing and referring diabetic patients for the preventative services that they need. Through a literature review, the importance of proper diabetic care and the impact on health care initiatives (in particular MU) on this care was examined.

### **Literature Search Strategy**

A literature review was conducted with the use of CINHALL plus Full Text database, Google Scholar linked with Walden databases, and Proquest. Search terms used included *Diabetes Mellitus II*, *Type II diabetes*, *Diabetes and preventative care*, *diabetes and compliance*, *diabetes and complication prevention*, *diabetes and MU*, *diabetes and EMR*, *EMR initiative*, and *MU*. Theoretical terms that were included were *Self-Care Deficit*, *Self-Care deficit and Diabetes*, *transtheoretical theory*, and *impact evaluations*. The parameters of the search included the years 2007-2013, although one article from 1999 was included as a means of comparison to more recent literature. The search included current peer-reviewed journals, and the articles examined were mainly quantitative or qualitative study designs. Some commentaries were included as they were from an accredited association such as the ADA.

### **Specific Literature**

Diabetic complications have been the subject of great interest in an effort to reduce the total cost of diabetes care (AHRQ, 2013; Gibson et al., 2011; O'Conner et al., 2011). Despite the recommended preventative care, there are still low percentages of diabetic patients who have received this care. In a report issued in 2012 on data from 2010 (CDC, 2012), only 62.8% of diabetic people received dilated eye exams and only 67.5% received annual foot examinations. Diabetic preventative measures have been shown to prevent complications and help to improve the morbidity and mortality associated with diabetes (Gray et al., 2012). Through the use of a 30-year simulation model, Gray et al. (2012), determined that if a diabetic patient met all of the quality targets in preventative care, they would experience an estimated 16% increase in life years and a 23% reduction in 15-year mortality. The question remains as to why patients are not receiving the recommended care.

He (2011) examined the impact of the patient's and provider's characteristics as a means of determining who will utilize preventative care measures in diabetes. He (2011) found that the majority of diabetes care is conducted in the primary care facility. The author found that patients often needed diabetic education and understanding as to why they needed preventative care (He, 2011). It was also determined that the PCP's lack of time contributed to in-adherence to preventative measures as the standards of diabetic care are many, and time is limited to ensure that the patient has received the recommended care (He, 2011). He (2011) also discovered that the lack of time can prevent the needed communication between the provider and patient.

Beverly et al. (2012) examined why patients were not willing to discuss their self-care habits with their providers. The results demonstrated that patients often did not want to disappoint their providers, so they did not talk about it, or they felt guilty for not doing something they were told to do. In addition, a significant number of patients were depressed and had not participated in self-care activities. The strategy was then to change the topic of conversation, which would often lead the provider onto a different disease state (Beverly et al., 2012). Another study by Currie et al. (2012) examined the impact of noncompliance in people with type II diabetes. Part of the reason that diabetic patients do not receive all the recommended care is patient noncompliance. Patients reported not taking medications and not showing up to their clinical appointments. If a patient does not show up to the clinic, then he or she cannot be reminded about the necessary preventative measures (Currie et al., 2012).

It is not the sole responsibility of the patient to ensure that he or she is receiving the necessary care. The provider must be an active participant in the care plan. Nam, Chesla, Stotts, Kroon, and Janson (2011) examined barriers to diabetes management from both a patient and provider standpoint. Provider factors that inhibit diabetes management included providers' attitudes towards diabetes management, lack of knowledge about current EBP standards and ADA recommendations, lack of knowledge about the patients feelings and perceptions about diabetes, difficulty communicating with patients, lack of time to spend with the patient, and having to deal with multiple disease states in the same office visit (Nam et al., 2011). With so many perceived barriers, what can be done to simplify diabetes management?



With the advent of EMR, the hope was to improve the quality of patient care and simplify the provider's work (Fleurant et al., 2011). The Massachusetts E-Health project examined the impact of EMR on patient health. The evaluation consisted of pre- and postintroduction to EMR in private clinics (Fleurant et al., 2011). They found that participants overall felt as though patient care was improved with EMR use, and they were more likely to use registries and evaluate medication usage through the EHR system. They also felt that chronic health conditions were better cared for, especially in the case of diabetes (Fleurant et al., 2011).

A similar intervention by Weber, Bloom, Pierdon, and Wood (2007) demonstrated that when an EHR system was used to provide audit feedback, pop-up reminders and recommendations in diabetes care, there was an overall improvement in diabetes care. Before the intervention, 56.5% of diabetic patients received annual influenza vaccination, and postintervention the percentage had risen to 80.8% of the patients (Weber et al., 2007). In another study, Cebul et al. (2011) found that compliance with ADA treatment standards improved when an EHR was used instead of paper charting. Finally, the implementation of Diabetes Wizard resulted in improved diabetes outcomes, improved rates of preventative treatments, and high PCP satisfaction with the EHR implementation (Sperl-Hillen et al., 2010). They did note though that with the implementation of EHR into clinical practice careful planning, proper training, and listening to feedback needed to take place in order for a successful intervention (Sperl-Hillen et al., 2010).

With the advent of EHR introduction into health care, it opened the door for improvement in health services (Ratner, 2011). In 2009, the MU initiative came into being with the hope of decreasing health care expenditure. With diabetes costing on average close to \$200 billion in health care expenditure, focus on improving diabetes is needed (ADA, 2013a). The goals of MU are to ensure that health care participants are receiving top quality health care for the money that is spent (Ratner, 2011). With the health care reform, more money was allocated for preventative health services and to reward practices that achieve MU criteria (Ratner, 2011). The goal has become to use the EHR/EMR systems in a meaningful manner.

MU is considered the use of an EMR system in a manner in which patient care is improved (Hogan & Kissam, 2010). The government made provisions for practices that are using their EMR in a meaningful manner and are willing to attest to the proper use to receive incentive funds of up to \$44,000 in payment (Hogan & Kissam, 2010). Hogan and Kissam (2010) tried to examine the extent to which MU was being used but found it very challenging and actually made the recommendation that this is an area of needed research. So, the question becomes how MU can impact diabetic care.

Ahmad and Tsang (2013) examined if MU has made an impact on diabetes prevention and preventative services. They found that the literature supported the use of decision support tools and management options (Ahmad & Tsang, 2013). The authors also found these options to fulfill many of the MU criteria. Examples of the tools they looked at included patient reminders, templates, and flowsheets. When clinics utilized these tools, there were higher rates of diabetic foot examinations, lower A1C levels,

greater microalbumin testing, and, finally, higher rates of diabetic eye examinations (Ahmad & Tsang, 2013). They did note that more research was needed concerning the full impact of MU on diabetes care.

### **General Literature**

Diabetes is a chronic disease state which can lead to many complications. The current expenditure on diabetes is \$174 billion dollars annually in direct and indirect costs (CDC, 2012; AHRQ, 2013). A large portion of the cost in treating diabetes is related to the treatment of complications (CDC, 2012; Gibson, Mahoney, Ranghell, Cherney, & McElwee, 2011). It is the leading cause of lower limb amputations and renal disease (Beaser & Brown, 2013; Currie et al., 2012). It is also a significant factor in heart disease and strokes causing it to be the seventh leading cause of death in the United States (Beaser & Brown, 2013; Schmittiel et al., 2008). Other complications include retinopathy leading to blindness, neuropathy leading to loss of sensation in lower extremities, peripheral vascular disease leading to lower limb amputation and nephropathy leading to dialysis (O'Connor et al., 2011; Schmittiel et al., 2008). Preventative care is essential in the prevention, early detection and early treatment of diabetes related complications (Currie et al., 2012; He, 2011). While screenings cannot always prevent complications, they do allow for early treatment helping to extend the life of the diabetic (He, 2011). Despite the recommended preventative screenings, many diabetic patients do not receive preventative services (He, 2011). As the rate of diabetes rises, the health care costs will continue to increase. Ways to improve participation in preventative treatment need to be examined.

Diabetes care is a complex and challenging process requiring a complicated interchange and partnership between a PCP and the patient (Beaser & Brown, 2013; Gray et al., 2012;). There are several factors that can contribute to lack of participation in preventative treatments. Patient factors can include cultural reasons, lack of education on the importance of these measure, insurance status, poor compliance with treatment recommendations and feeling uncomfortable about discussing failures with the clinicians (Beverly et al., 2012; Campbell & Hilleman, 2010; Traylor et al., 2010; Zhan et al., 2009).

It is important that the provider feels comfortable with the recommended preventative services and understands the importance of the recommendations (Beaser & Brown, 2013). One factor that can affect the providers' ability to provide the preventative care is the presence of other comorbid conditions (Sales et al., 2009). The more comorbid conditions the more complicated the treatment regimen becomes and often preventative measures are overlooked (Sales et al., 2009). Another factor is the lack of understanding about the current evidenced based practice protocols (Beaser & Brown, 2013; Evans, 2010). Evidence based practice protocols have shown to improve both diabetes care and outcomes (Evans, 2010; Marrero et al., 2013; Stetson, Ruggiero & Leonard, 2010). Evidenced base practice is considered the utilization of the latest research in clinical practice while at the same time providing a tailored treatment approach (Vratny & Shriver, 2007). Evidence based practice approaches allow the PCP to provide justification for why the treatment was selected based on evidence that the treatment has been shown to be effective (Stetson, Ruggiero & Jack, 2010; Vratny & Shriver, 2007).

The goal is through the use of EBP standards the overall quality of patient care will increase and complications associated with chronic illness will diminish (Gray et al., 2012; Marrero et al., 2013; Stetson, Ruggiero & Jack, 2010).

It is not enough that the provider understand what the evidence is. The provider must take this a step further and recommend to the patient that the preventative practices be performed (Beaser & Brown, 2013). Providers expect their patients to be compliant with the treatment plan set out, and yet providers are not always providing the recommended care (Beaser & Brown, 2013; Gray et al., 2012; Jeimenez-Garcia et al., 2011; Marrero et al., 2013;). Part of the gap in treatment and lack of preventative care measures exist because providers are slow at adopting EBP into practice, they are set in their ways and do not want to change, or they are not up to date with the latest treatment recommendations (Beaser & Brown, 2013; Fox, 2010; Marrero et al., 2013). Two examples of this are the lack of intensification in medication treatment and the low percentages of patients receiving preventative care within the United States (Beaser & Brown, 2013; Schmittdiel et al., 2008).

While the practices of group treatment, telephone follow-up, implementation of a diabetes educator into clinical practice, transparency of data and clinic within a clinic are all ways that treatment can improve, for a small private practice, they are not always feasible (Clancy, Huang, Okonofua, Yeager & Magruder, 2007; Fray, Drayton-Brooks & Williamson, 2013; Davis et al., 2010; Johnson & Raterink, 2009; Moran, Burson, Critchett & Olia, 2011). One proposed way to help improve clinician's care of patients no matter the size of the clinic was the implementation of EMR systems into health care

(Murphy, 2010). The institutes of Medicine's report *To Err is Human*, highlighted the rate of medical mistakes and lack of quality of health care in the United States (Murphy, 2010). The government responded to this report with the mandate that by 2014 all medical offices needed to use a certified EMR system (Murphy, 2010). This was taken a step further with the 2009 American Recovery and Reinvestment act which allocated funds to assist practices into the transition of using EMR systems providing that these offices met certain criteria (Fleurant et al., 2011). Examples of this include patient reminder features, use of flowsheets, tracking systems, electronic submission of prescriptions, providing patients with visit summaries and patient educational materials (Ahmad & Tsang, 2013; Hogan & Kissam, 2010; Koopman et al., 2011). Not all providers are aware or are comfortable with the use of EMR systems let alone using them in a meaningful fashion (Palacio, Harrison & Garet, 2007). They can be perceived as an expensive investment, time consuming, cumbersome and impersonal (Palacio, Harrison & Garet, 2007; Miller & Sim, 2004). The goal was through meaningfully using an EMR system, not only will patient care improve but preventative care rates will also improve, and health care expenditure will go down (Fleurant et al., 2011).

EMR systems have been used to examine data regarding the state of diabetes care within the United States (Beirnstein, 2007; Cebul, Love, Jain & Herbert, 2011; O'Conner et al., 2011; Sperl-Hillen et al., 2010). EMR systems that containing pre-formatted diabetic templates were successful in improving treatment standards (Cebul et al., 2011; Fleurant et al., 2011; Sperl-Hillen et al., 2010). EMR systems have also been shown to improve compliance with documentation especially when it is known that the data will be

used to track compliance with treatment standards (O' Connor, 2010; Sperl-Killen et al., 2010).

The question remains about the effectiveness of EMR systems in diabetic care in small practices. EMR systems have been studied in larger practices and in some studies have been shown to improve patient care (Fleurant et al., 2011; Sperl-Hillman et al., 2010). Few studies exist that examine the effectiveness of EMR in a small private practice. This may be due to EMR systems are still not adopted in all practice. In addition, there are not many studies which examine the effect of MU initiative on improvement in diabetic care, especially in a small practice setting. Reasons for the lack of studies could be because MU is a recent initiative (Blumenthal & Tavenner, 2010; Hogan & Kissam, 2010) and some practices have been slower to adopt its mandates (Blumenthal & Tavenner, 2010). Similarly, there were very few studies which examined the effectiveness of educating the providers on how to use EMR systems to adhere to ADA treatment standards. This is an area that needs to be examined.

FMA is a small private practice in Hendersonville, Tennessee. The primary investigator (PI) for this project is currently an employee at the facility and is also using the facility as part of a practicum. The PI realized the need to streamline diabetic treatment within the practice and an easy way to track preventative care measures. This led to the development of the current project to not only educate providers about the need for preventative care, but also show how to utilize the EMR to track who has received the preventative care. By utilizing the EMR system in this fashion, FMA will also comply with MU measures. The PI's current perspective about the project is that MU of EMR

systems needs more investigation in small private practices and utilizing FMA will help to advance this research.

### **Models and Theories**

The first theory that was chosen is Dorthea Orem's self-care deficit theory. The theory states that self-care is considered what a patient does in an effort to take care of himself/herself (Akoyl, Cetinkaya, Bakan, Yarah, & Akkus, 2007). On their own patients lack the necessary skills to produce optimal health outcomes (Akoyl et al., 2007; Kumar, 2007; Wilson et al., 2008). It is up to the nurse to evaluate and diagnosis the deficit and then to create an intervention which will help the patient to overcome his/her deficit. The result should be an improvement in the patient's health care status (Kumar, 2008; Wilson et al., 2008). This model has been used widely as a basis for the rationale behind interventions when related to diabetes care (Beecher & Appel, 2013; Evans, 2010; Kumar, 2007; Sousa, Hartman, Miller & Carroll, 2009). The implemented improvement project held the assumption that without reminders, patients will not receive the necessary preventative care. It was up to the provider to provide these reminders. If the provider was consistent about reminding the patient and providing the necessary referrals, the goal was that the patient's participation in preventative measures would increase.

The second theory that guided this project was the Transtheoretical Model of Behavioral Change. This model recognizes that there are five stages of change. The first stage is pre contemplation where there is no desire to change behavior (Singer, 2007). The second stage is contemplation where there exists an awareness that the behavior needs to change (Singer, 2007). The third stage is preparation where a plan is laid, and



preparation starts for the behavioral change (Andres, Gomez & Saldana, 2008). The fourth stage is the action phase where individuals implement behavior modifications (Andres, Gomez & Saldana, 2008). The last stage is maintenance where individuals work to maintain the changes made (Andres, Gomez & Saldana, 2008; Singer, 2007) While traditionally this has been applied to diabetic patients, this theory has been used for the implementation of changes in general. It was used to guide the change in behavior needed by providers in order to use templates and flowsheets within the EMR system. It was used as the educational intervention was being implemented to help ascertain how responsive providers are to the proposed changes within their diabetic care models.

### **Summary**

In an age where diabetes is on the rise, it is necessary that providers understand current treatment standards. It is also vital that these standards are applied to practice. Remembering the many treatment standards for diabetes is challenging for health care providers. The MU of EMR systems could help providers to remember and ensure that diabetic patients are receiving the standard of care. This project looked to advance nursing practice through the examination of how MU could enhance diabetic care in a small private practice. The PI in this project works in a small private practice and was interested in making a positive impact to the practice. In addition the PI wondered if a small practice could overcome the challenges with incorporating MU into a small practice.

This project was partly based on Dorthea Orem's self-care deficit theory. Since the patient has a self-care deficit that prevents them from receiving all the preventative

care, it is up to the provider to implement an intervention which will overcome this deficit. The use of the EMR and reminder systems was hoped to provide this intervention. The difficulty lied in adapting the providers to a new way of practicing. The transtheoretical design allowed for the assessment and tracking of the providers willingness to change. Monitoring the progress through the stages of change was used to ensure that the educator adapted the reminders and gave encouragement in order to progress towards the final phase of maintenance. The overall goal was to improve the care provided to the diabetic patient at a small family and internal medicine practice.

## Section 3: Methodology

### **Introduction**

Diabetes preventative care is essential in the prevention of diabetes-related complications (ADA, 2013c). With the increasing demands of clinical practice, it can be difficult to ensure that patients are receiving the proper preventative care (Parchman et al., 2010). EMR systems can allow for easy tracking through the use of templates and flowsheets, but this is only effective if the provider uses these (Murphy, 2010; Stetson et al., 2010). The purpose of the current project was to examine the improvement of preventative care rates through the MU of an EMR system by utilizing flowsheets and templates to track diabetic preventative care. In order to examine the effect of MU of an EMR system, an impact evaluation approach was utilized.

### **Project Design and Methods**

#### **Design**

This project was a quality improvement project with an impact evaluation at the end of the intervention. The project consisted of first adapting the diabetic treatment template within the EMR system at the research site to reflect the current 2013 ADA standards of diabetes care. This template was linked to a diabetic flowsheet where the dates of the preventative services, results of lab work, and vital statics were maintained. Once the changes were made to the system, providers were educated about the 2013 ADA treatment standards of care. They were also educated on the diabetic template found within the system and the diabetic preventative care flowsheet, the changes that had been made to these, and how they interacted together. They were taught how to use

these features in order to track diabetic preventative care. They were given information as to what they were expected to do as part of the quality improvement project. A question and answer session was provided in order to clarify any misconceptions or misgivings. FMA was provided with an Initiative/Program/Intervention Oversight and Data Use Agreement with Employer form to consent to the project being performed in the clinic (See Appendix B for a copy of the form). The consent form consisted of a brief summary of the intervention, the fact that the data would be disclosed to Walden University, and they would be giving permission for the data to be used to track improvement in diabetic preventative care rates at FMA. The form also included the risks and benefits of the improvement project, the fact that there would not be any payment for participation. Once the clinic consented to participate, the providers were educated on the 2013 standards of diabetes care and on how to use templates and flowsheets within the EMR system. Data from the 3 months prior to the intervention were collected and compared with the data 3 months after the intervention to determine if the intervention improved the preventative care measures received in the diabetic population at FMA. In addition, a program impact evaluation was conducted to determine the effectiveness the intervention had on the providers and patients including diabetic preventative care measures of annual foot examinations, annual eye examinations, and annual microalbumin screenings. Impact evaluations examine if the short-term goals established resulted in the anticipated change (Hodges & Videto, 2011). The evaluation could also help to determine if the implemented quality improvement project would allow for achievement of long-term goals resulting in permanent changes (Friis & Sellers, 2009).

## **Population and Sampling**

FMA is an internal and family practice located in Hendersonville, Tennessee, which is a suburb of Nashville. Based on a 3-year audit of active charts, at the time of this study FMA had 2,300 patients, of which 362 were diabetic patients. The intervention focused on training the four providers (one DO, one MD, one PA, and one NP) in diabetic care and preventative measures and how to track these through the use of flowsheets and templates within an EMR system. It examined the impact on the diabetic care given 362 diabetic patients found at FMA. Most diabetic patients at FMA are seen every 3 months for routine diabetic follow-up care. It was expected that, in a 3-month period of time, most of the 362 diabetic patients would be seen. Thus, the same group would be seen in the subsequent 3 months following the intervention. This was considered a convenience sample because the patients were not chosen by random and instead were chosen based on whether they made and kept the follow-up appointments (Burns & Grove, 2009). Similarly, the providers were a set group of four people and were not randomized; all of the providers were provided the education. The providers were the key stakeholders in this project. It was necessary that all four providers were on board with the intervention. The key stakeholders at FMA were already supportive of the intervention and agreed to encourage all providers to participate. The owner of FMA is leading the clinic in attestation for MU initiative. The project holds the potential to help the clinic to attest to MU objectives. Data that were collected prior to the intervention were used in training to stress the importance of compliance with diabetic preventative measures and was used to motivate the providers. While the number of providers was

small, the number of diabetic patients was substantial at approximately 362. The 362 diabetic patients were established from the preliminary data, and this did not include diabetic patients who had joined the practice since the initial data were obtained.

According to the sample size calculator located at the Creative Research Center website, a sample size of 329 patients was needed; thus, a sample size of 362 patients would be considered significant. This was based on a confidence level of 95% and a confidence interval of  $\pm 5$  based on the population size of 2,300 patients (Creative Research Center, 2013).

## **Data Collection**

### **Instrument**

The data that were collected were data centered on the diabetic follow-up encounter. The data sets that were collected and examined included diabetic patients receiving dilated eye examinations, annual monofilament foot examinations, and annual microalbumin levels. The ADA (2013c) has recommended that diabetic patients receive these interventions on an annual basis to avoid diabetes-related complications. These data were chosen because they could be easily generated through the existing EMR system and reflect standard of care. The data collected were used in the impact evaluation to determine if the intervention helped to improve the quality of patient care at FMA.

The existing EMR system at FMA allowed providers to collect data running ICD-9 codes against CPT codes, vital signs, and laboratory results. The data were collected by running a search for 250.00-250.03 against the CPT codes of (a) 2028F (annual monofilament foot examination), (b) 2022F: Annual dilated eye examination, and (c)

82044QW (annual micro albumin). These data were collected through a MU Dashboard called Crystal Reports. Crystal Reports automatically runs the ICD-9 codes against the appropriate CPT code and flowsheet entry to determine the percentage of diabetic patients who received the recommended service. For example, one of the Crystal Reports is the percentage of diabetic patients with microalbumin urine screening. These data were placed in a spreadsheet and converted into percentages to give the baseline data. The intervention took place, and then 3 months later the same data were collected and added to the spreadsheet in a separate column. The two columns were compared to evaluate the change in the percentages of patients who had received the preventative care.

The data collected gave the number of patients receiving each intervention during the selected time frame of 3 months. This was compared to the number of eligible patient encounters where the CPT code could have been generated. This allows an average to be computed. Preintervention data were compared to postintervention data in order to examine the impact of the intervention on diabetic care. These data were matched through the use of the same search parameters and placed into the appropriate columns. For example, diabetic patients receiving microalbumin testing 3 months prior to intervention were compared with 3 months after intervention. By running the same searches both times, it ensured that the data were accurately matched. The hypothesis was that the averages after the intervention would be higher than the averages prior to the intervention. It was hoped that it would also demonstrate that when EMR systems are used meaningfully, they could result in the improvement of patient care.

## **Protection of Human Subjects**

In order to ensure patient privacy the names of the patients were left off the data collection sheets. For purposes of this quality improvement project, only the number of diabetic patients seen and the number receiving each intervention were collected. This ensured that the patients' names are not disclosed in the research process. The data was collected by the primary investigator (PI) and was shared with the office manager and the providers. The office manager was included because she was the one that reports the PQRS and MU data to Centers for Medicare Services. The data was both printed out and kept on a spreadsheet. See figure one at the end of the document for an example of data collection spreadsheet. The printed out data will remain in a locked safe at the PI's house for the duration of five years. The spreadsheet that exists in the computer is password protected allowing only the primary investigator access to the information that it contains. Finally an application for the project was submitted to Walden University's IRB board for review. The IRB has granted approval for the quality improvement prior to its implementation with an approval number of 04-10-14-0388447.

## **Data Analysis**

### **Reliability and Validity of Data**

The existing data collection method within the current EMR system at FMA was considered to be a reliable tool in acquiring information. This is used by the office to submit data on PQRS and MU initiatives. The EMR providers (eMDs) has tested and assured of reliability in the data collection methods. No modifications were made to the existing data collection instruments within the EMR system. In order to ensure that the



information was reliable and consistent, the same set of parameters were used in both the pre-intervention and post-intervention data collection. The same ICD-9 and the same CPT codes were used in order to allow for accurate data collection.

### **Analytical Techniques**

The quality improvement question examined the impact on diabetic care through education and subsequent MU of an EMR system to track diabetic preventative care. The statistical analysis consisted of a comparison of the percentage of patients who received, annual dilated eye examination, annual monofilament foot examinations and annual micro albumin levels prior to the intervention and then 3 months post intervention. The assumption was that the diabetic patients seen were the same, or close to the same, as three months prior to the intervention and then again within the three months after the intervention. It was also assumed that while the providers may provide similar care, the care the diabetic patients received is not exactly the same from provider to provider prior to the intervention. It was also assumed that the providers would adapt the recommended standard of care and methods of tracking this care among the diabetic patients in their care after the intervention.

In order to track the data, a spreadsheet was developed. Baseline data from the three months prior to intervention was entered in the categories of microalbumin, dilated eye examination, foot examination and was labeled as pre-intervention. The second data set was labeled post-intervention and consisted of the same data as above, only taken from three months after the intervention. The data was compared to determine the

percentages of improvement from baseline to three months after the intervention in order to establish if the intervention achieved the goals that it was seeking to achieve.

### **Project Evaluation Plan**

In order to determine if the project achieved its goals an evaluation plan was developed and then implemented. The project examined the impact of MU of EMR on diabetic preventative care in a primary care setting; therefore an impact evaluation format was used. Impact evaluations examine the effect of an intervention on the environment and people where the intervention took place (The World Bank, 2013). Impact evaluations seek to determine the effect of the intervention and how the intervention may be changed to achieve the desired or a greater effect (The World Bank, 2013). Often impact evaluations ask a series of questions designed to aid in determining the effect (The Organization for Economic Cooperation and Development [OECD], n.d.). The following questions have been developed from a list of guidelines published by the Environmental Protection Agency on how to develop impact evaluations (EPA, 2009) and will be used to examine the impact of the quality improvement project:

1. Did the program achieve its goal?
2. Are there any unintended effects because of the program?
3. How effective was the intervention compared to other possible interventions?
4. What could have been the results if the intervention had not been implemented?
5. If the intervention did not work, what contributed to the intervention not achieving its goals?

6. If the intervention did work, what contributed to the intervention's success?
7. Is the intervention worth sustaining?

Part of the impact evaluation examined what diabetic care would potentially have looked at if the intervention was not implemented. This can help to further clarify why the intervention is needed and should be sustained (OECD, n.d.).

### **Summary**

Project design and the methods utilized to collect and examine data are an important part to all research projects. The current project took the form of a quality improvement project and examined the percentage of improvement from baseline to three months post-intervention. In order to protect the identity of diabetic patients, numerical data from the EMR system was acquired leaving out the patients' names. The data will be kept in a spreadsheet, and pre and post percentages of diabetic patients receiving annual microalbumin, annual eye examinations and annual foot examinations were examined. An impact evaluation was performed to examine the impact of the intervention on diabetic preventative care at FMA.

## Section 4: Findings, Discussion, and Implications

### **Introduction**

The question addressed by this improvement project was whether the implementation of provider education on use of the current EMR system at FMA and education on the 2013 ADA standards of diabetic care led to improvement in diabetic care at FMA. The purpose of the project was to examine the effect of the MU of the EMR system on diabetes preventative care practices. The first object of the project was to educate practice providers on 2013 ADA treatment standards. The second objective of the project was to educate the practice providers on how to use the existing EMR system at FMA in a way consistent with the MU objectives concerning diabetes care. The third objective was to monitor the utilization of these features as it relates to improvement in the rates of preventative treatment. These objectives were to be accomplished through the modification of the existing diabetic treatment templates and flowsheets within the existing EMR system at FMA. The providers were then educated on the 2013 ADA diabetic treatment standards and about how to use the EMR system to order and record performance of the preventative measures being monitored. Clinical data concerning the percentage of patients receiving the preventative measures 3 months prior to the intervention were collected and compared to the percentage of patients that received the preventative care during the 3 months of the improvement project. An impact evaluation was conducted at the end to determine the effect that the improvement project had on the clinic. The impact evaluation determined that the program was able to meet the objectives of education of providers on the current ADA treatment standards and to educate the

providers on how to use the EMR system to track diabetic patients who received preventative care. The project met the program's stated goals of increase in rates of diabetic patients receiving preventative treatment. The impact evaluation did conclude that the quality improvement project was worth sustaining because there was an increase in diabetic patients who received preventative care with an increase of 5.07% of patients receiving care. This has the potential over time to increase the percentage of patients who receive the preventative care within the practice.

### **Summary of Findings**

The question behind the quality improvement project was as follows: Will the implementation of provider education on use of the current EMR system at FMA and education on the 2013 ADA standards of diabetic care lead to improvement in diabetic care at FMA? The project did indicate an increase in the patients who received preventative care standards of annual dilated eye examinations, annual microalbumin levels, and annual monofilament foot examinations. During the 3-month improvement project timeframe, 309 diabetic patients received care at FMA. Patients who received microalbumin screening increased from 9.73% to 10.67%, dilated eye examinations increased from 35.28% to 37.79%, and annual microfilament foot examinations increased from 19.42% to 21.10% (see Figure 1 in the impact evaluation).

The first objective of the project was to educate practice providers on the current ADA treatment standards. This objective was met through an education session with the providers, during which they were educated on current ADA treatment standards both in oral and written form. The second objective of the project was to educate the practice

providers on how to use the existing EMR system in a way consistent with the MU diabetic patients preventative care measures. Within this objective there were three smaller objectives: (a) teaching the providers about the diabetic flowsheet, (b) how to use the EMR diabetic treatment template, and (c) how these two items interconnect to make documentation easier. The second objective, with its subset of objectives, was achieved through an education session during which the providers were educated on the location of the templates and flowsheets within the EMR system and how the template and flowsheet interact to create a complete view of diabetic care. The third objective was to monitor the utilization of these features as it relates to improvement in rates of preventative treatment measures within FMA. This objective was reached through the collection of data from 3 months prior to the intervention to the 3 months during the intervention. As depicted in Figure 1, overall the clinic saw a modest improvement in the three preventative measures of annual dilated eye examination, annual monofilament foot examinations, and annual microalbumin levels.

At the end of the project, an impact evaluation was used to determine the effectiveness of the project. The impact evaluation examined the following questions:

1. Did the program achieve its goal?
2. Are there any unintended effects because of the program?
3. How effective was the intervention compared to other possible interventions?
4. What could have been the results if the intervention had not been implemented?

5. If the intervention did not work, what contributed to the intervention not achieving its goals?
6. If the intervention did work, what contributed to the intervention's success?  
Is the intervention worth sustaining?

The impact evaluation determined that the project did achieve all three goals through education session and increase in the percentage of the 309 diabetic patients who received preventative care measures of dilated eye examination, microalbumin levels, and monofilament foot examinations. It was also determined that the project was worth sustaining because there was an increase in the overall number of patients receiving preventative care. Each question in the impact evaluation is discussed in more detail below.

### **Impact Evaluation**

The project question was as follows: Will the implementation of provider education on use of the current EMR system at FMA and education on the 2013 ADA standards of diabetic care lead to improvement in diabetic care at FMA? Providers were educated on ADA treatment standards and how to use the EMR system in a meaningful manner to track diabetic patients receiving annual monofilament foot examinations, annual urine microalbumin levels, and annual dilated eye examinations. The quality improvement project took place over a 3-month period of time during which providers were reminded to record the referrals for the dilated eye examinations, document if the patient received the eye examination in the flowsheet, document and bill for the monofilament foot examination, and to both document and bill for the annual urine

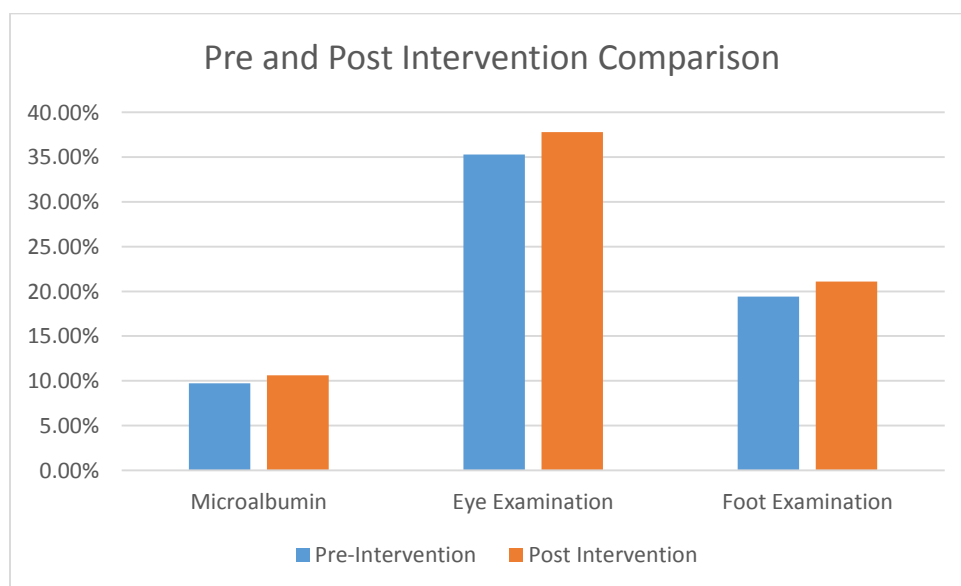
microalbumin screening. Three providers and 309 patients were tracked during the reporting time frame. The providers consisted of one nurse practitioner, one medical doctor, and one doctor of osteopathic medicine. The patients consisted of new and existing patients who have diabetes mellitus and who had appointments during the 3-month time frame prior to the intervention and/or during the 3-months after the intervention. Age range for the patients consisted of 18-99 years of age and consisted of patients who had private health insurance, Medicare, and those who had no health care insurance. All three providers received the same education. They were advised that over the next 3 months data would be collected concerning the rates of diabetic patients receiving the preventative care measures of annual microalbumin screening, annual dilated eye examinations, and annual monofilament foot examinations. These data would then be compared to data from 3 months prior to the intervention to track improvement in diabetic care within the practice.

**Question 1: Did the program achieve its objectives?**

Objective 1 was to educate on 2013 ADA diabetic treatment standards. An education session was conducted that provided both oral and written materials concerning 2013 ADA treatment standards. The second objective was to educate the providers on how to use the existing EMR system in a way consistent with MU objectives. This included teaching providers about diabetic flowsheet and treatment template available in the chart and how these two interact to provide a complete overview of diabetic preventative care measures. Providers received this education and it was demonstrated to them how to utilize these features in the existing EMR system.



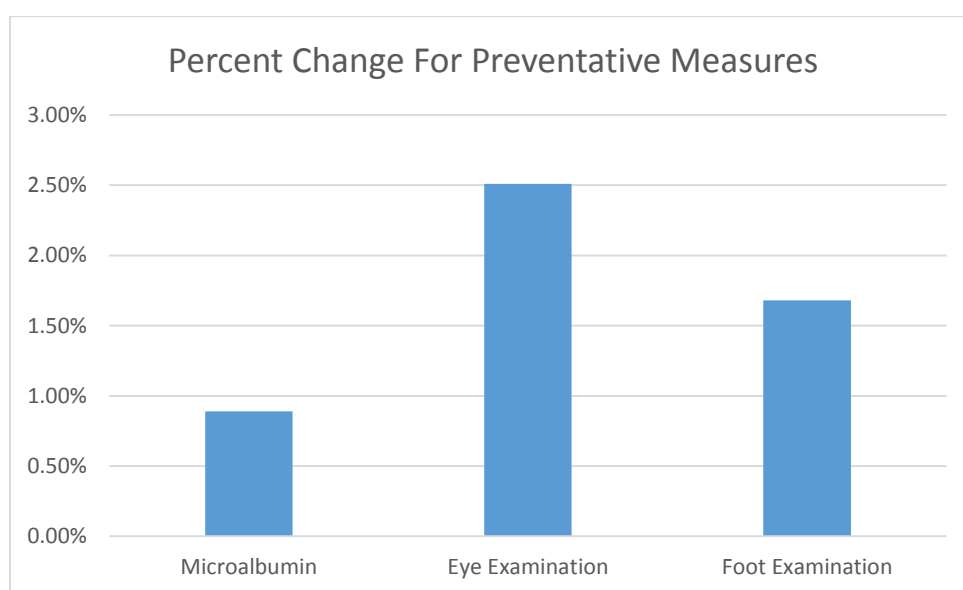
The third objective was to monitor the utilization of these features as it relates to improvement in the rates of preventative treatment measures within FMA. Data was collected for the three months prior to the implementation of the quality improvement project and then again for the three months during the improvement project. The two data sets were compared. The results showed minimal improvement in the percentage of diabetic patients receiving the recommended preventative care measures of annual monofilament foot examinations, annual dilated eye examinations and annual urine microalbumin screening (see Figure 1).



*Figure 1.* Comparison in the percentage of patients who received recommended diabetic preventative measures pre and post intervention.

There were increases across all categories of patients' receiving preventative care which is a positive improvement, but the percentages of increase were not as large as might have been seen using a larger provider group. Results in this pilot program have positively affected 5.07% of subjects, improving their preventative care measures in this

small practice. Of the 309 subjects in this program, for patients receiving urine microalbumin screening tests there was a 0.89% increase with the percentage increasing from 9.73% to 10.67%. For the measure of eye examinations there was a 2.5% increase with the percentages increasing from 35.28% to 37.79%. Finally for the measure of annual microfilament foot examinations there was an increase of 1.68% with an increase from 19.42% to 21.10% (see Figures 1 and 2 for display of information).

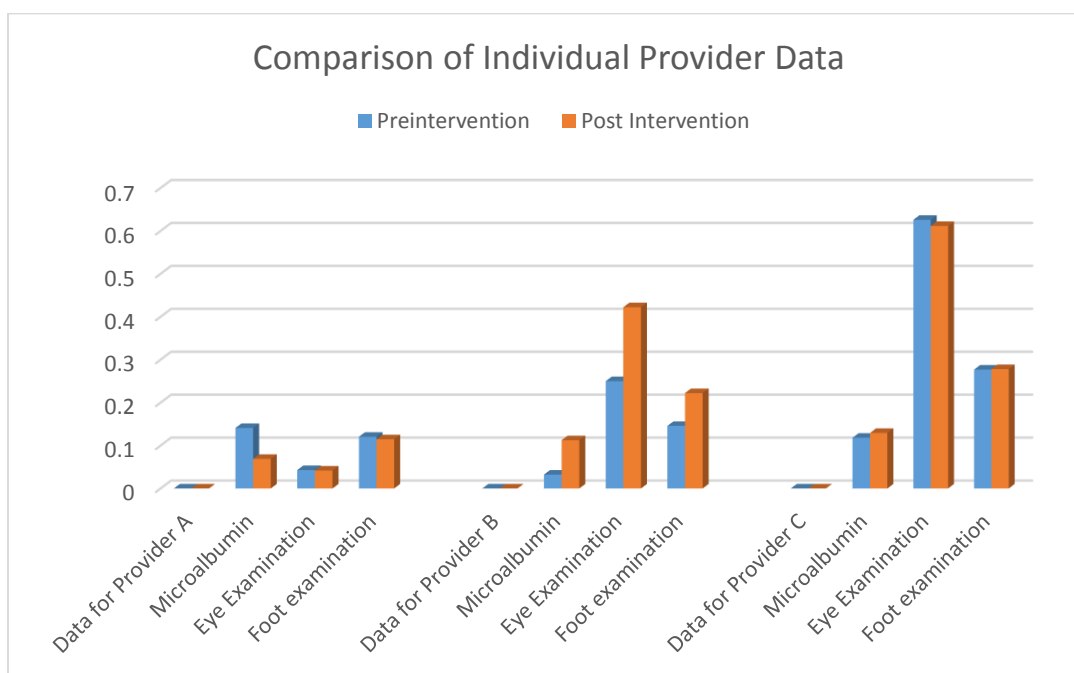


*Figure 2.* Percentage of Change from pre to post intervention on the measures of Microalbumin, dilated eye examinations and annual microfilament foot examinations. .

This supports the idea though that the project is worth sustaining. If the clinic can keep an improvement rate of 5.07% quarterly then in the course of a year approximately 20% or an increase of 62 patients who received preventative care would be seen.

During the intervention each provider responded in a different way to the improvement project. When individual results were analyzed it showed that Provider A had no improvement during the project and in fact percentages went down. Provider B

had an increase in all categories. Provider C performed the recommendations more frequently prior to the intervention and had little improvement throughout the course of the intervention (see Figure 3 for summary of the data).



*Figure 3.* Comparison of Individual Provider Data pre and post intervention for measures of urine microalbumin screening, annual dilated eye examination and annual foot examination.

Table 1

*Individual Provider Data for Pre and Post-Intervention*

<b>Prevention Recommendation</b>	<b>Pre-intervention</b>	<b>Possible</b>	<b>Percent Receiving</b>	<b>Post Intervention</b>	<b>Possible</b>	<b>Percent Receiving</b>
Microalbumin	29	298	9.73%	31	292	10.62%
Eye Examination	109	309	35.28%	116	307	37.79%
Foot examination	60	309	19.42%	65	308	21.10%

<b>Data for Provider B</b>	<b>Pre-intervention</b>	<b>Possible</b>	<b>Percent Receiving</b>	<b>Post Intervention</b>	<b>Possible</b>	<b>Percent Receiving</b>
Microalbumin	3	93	3.23%	10	89	11.24%
Eye Examination	24	96	25.00%	38	90	42.22%
Foot examination	14	96	14.58%	20	90	22.22%

<b>Data for Provider C</b>	<b>Pre-intervention</b>	<b>Possible</b>	<b>Percent Receiving</b>	<b>Post Intervention</b>	<b>Possible</b>	<b>Percent Receiving</b>
Microalbumin	15	127	11.81%	15	116	12.93%
Eye Examination	81	130	62.58%	74	121	61.16%
Foot examination	36	130	27.69%	34	122	27.81%

<b>Data for Provider A</b>	<b>Pre-intervention</b>	<b>Possible</b>	<b>Percent Receiving</b>	<b>Post Intervention</b>	<b>Possible</b>	<b>Percent Receiving</b>
Microalbumin	11	78	14.10%	6	87	6.90%
Eye Examination	4	83	4.28%	4	96	4.17%
Foot examination	10	83	12.05%	11	96	11.46%

Each provider received the exact same training, yet the results were varied. The Transtheoretical model of behavioral change could provide some insight into the different results. According to this model there are five levels of changes: pre-contemplation, contemplation, preparation, action and maintenance (; Andres, Gomez & Saldana, 2008; Singer, 2007). If the providers were in different stages of change, then the results would

be different. When assessed in the context of the Transtheoretical model Provider A could have been classified in the pre-contemplative state. Provider A was aware of the need to change, but did not change during the project. Provider B could be classified in the preparation and action phases. Provider B prepared for change and then took action to implement the changes. Provider C could be classified in the fourth and fifth stages of the model which is action and maintenance. Provider C had already implemented the changes prior to the project and was working on maintaining the changes already made.

In response to question one: did the program achieve its objectives? , the answer is that the project did achieve its objectives. The project resulted in fulfillment of objective one education of providers on ADA standards and of objective two how to meaningfully use the EMR system by utilizing flowsheets and templates to track diabetic care. The third objective of monitoring was achieved as well and there was an increase in the percentages of patients receiving preventative care with over 5% of the 309 diabetic patients being impacted. It was hoped that this percentage would be larger however.

There are several reasons why a larger percentage of patients were not impacted. One reason could be the amount of information that the providers had to learn for the project. Another reason is lack of time during patient encounters. With new regulations from the government and from insurance companies it becomes overwhelming to incorporate all the recommended changes into clinic setting and can cause providers to take shortcuts or fail to record referrals or services rendered (Parchman, Zeber, & Palmer, 2010). A third reason was disruption within the clinical setting by a provider leaving. The remaining providers had to see more patients in a day which further caused time issues. A

forth reason could be the short time frame within which the project was implemented. If the project was allowed to continue for a full year, then it is possible that more diabetic patients would have received the recommended preventative care. Finally there was both a small sample size of patients and providers. If more patients and more providers were enrolled within the program the percentage of improvement could have been higher. The sample size of both patients and providers was limited because the project was implemented into a small private practice.

**Question 2: Are there any unintended effects because of the program?**

One unintended effect of the program was to highlight the lack of time within the primary care setting to utilize the EMR system effectively. The common complaint was that there was not enough time to utilize the templates and flowsheets provided and that shortcuts in charting were often used. The shortcuts that were discussed included just free-texting (or simply typing) the history of present illness and treatment plan instead of using the templates provided which led to data not being captured. If the templates and flowsheets are not used the data is not captured which results in lower numbers being reported not only to this project but also when attesting to MU. The reporting systems use CPT codes and data fields within the templates and flowsheets to gather data to report. If the templates and flowsheets were not utilized, then no data will be gathered and it will appear that the patient did not receive the preventative testing. Provider C reported seeing some of Provider A's patients and they had received the recommended care, but when examining the prior office visits, the preventative care had not been recorded. This brings up a concern for when MU is attested to within the clinic. If the EMR system has not

been used to capture the data the clinic will have lower than expected numbers and will not be able to attest to MU. This would result in loss of revenue for the clinic. This highlights an area that needs to be further evaluated not only for the sake of the improvement in patient care but also to ensure that the clinic is able to attest to MU.

**Question 3: How effective was the intervention compared to other possible interventions?**

When examining how to improve the rate of diabetic patients receiving preventative care within a small private practice, it was difficult to find projects or programs that are feasible to implement. Improvement projects that have been implanted in other practices include the implementation of a diabetic educator into clinical practice, group treatment and telephone follow-ups (Clancy et al., 2007; Davis et al., 2010; Fray, Drayton-Brooks & Williamson, 2013; Johnson & Raterink, 2009; Moran, Burson, Critchett & Olivia, 2011). With one complaint on the existing project being time constraints, utilization of group treatment and telephone follow-ups could create the same complaint and likely result in similar results. Group treatment would hold the potential to make documentation more difficult and the possibility of patients not giving truthful answers because the fear of disappointment for the provider and group (Beverly et al., 2012; Currie et al., 2012). The implementation of a diabetic educator and telephone follow-ups also present the issue of added expenses to the clinic, which for a small private practice could prevent them from incorporating the changes into clinical practice. The intervention that held the potential to provide the most impact on the clinic was the MU of the EMR system. Outside of MU, the other project that held the most potential to

make a greater impact on improved rates of diabetic preventative health measures, was the telehealth intervention. Davis et al, (2010), found that for an underserved community a telehealth initiative where diabetic patients were contacted achieved better diabetic control and fewer complications. These patients were reminded of preventative services and their glucose levels were monitored and medications changed over the phone. If the Telehealth initiative were implemented instead of the MU project, it would not have been expected to result in different outcomes. One of the voiced complaints for the MU project was the lack of time and this would have been realized within the Telehealth initiative as well. The issue would have been where the providers, or the nurses, would have found time in order to make the phone calls. In a clinic setting where providers and staff are busy from 7:30-5:30 and later, finding additional time to make phone calls would have been difficult. It would have likely resulted in the need to hire an additional staff member to make the phone calls. This is an added expense that the clinic could not have afforded. As a small private practice FMA struggles to make ends meet and the resources to hire an additional person do not exist.

**Question 4: What could have been the results if the intervention had not been implemented?**

If the intervention had not been implemented there would have continued to be a lack of awareness about evidenced based treatment standards for diabetic care. The templates and flowsheets would not reflect the up to date care standards and fewer patients would have received or have been referred for preventative care. This would result in difficulty attesting to MU criteria resulting in inability to receive the incentive



money. Provider B would have continued to have lower than normal rates of diabetic preventative care. For Provider C this helped to reinforce the treatment and documentation of the treatment diabetic patients were receiving. Without the adaptation of the flowsheets and templates, it would be more difficult for Providers B and C to continue providing the care. For Provider A there was actually a decline in the number of patients receiving preventative care so for Provider A, if the project was not implemented the question becomes would the number of diabetic patients receiving preventative care have stayed the same or would they have dropped lower as what was seen in the study.

**Question 5: If the intervention did not work, what contributed to the intervention not achieving its objectives?**

While the project did achieve all three of the objectives of the intervention, the percentage of patients impacted remained small at 5.07%. Lack of time was a common complaint throughout the three month intervention. When the templates and flowsheets are initially used it does take time to get the information loaded in so it can be utilized not only at that visit but at visits in the future. Also using the flowsheets and templates requires more time than simply typing the text into the chart. The advantages of using the flowsheets and templates it is allows for data to be more accurately recorded. They also serve as a means to ensure that diabetic patients are receiving comprehensive care as it prompts the providers to ask certain questions and to perform preventative measures.

The second reason was that providers have to be receptive and willing to make the changes that are being asked of them. If providers are unwilling to change or perceive the changes as added work, then they will not incorporate them into clinical practice

(Palacio, Harrison & Garet, 2007). The Transtheoretical Model of Behavioral Change discusses the five stages to change (Singer, 2007). It is important when starting a project to assess where each participant is in the stages of change and try to adapt the project around the individual when possible (Singer, 2007). The current project was difficult to adapt around each provider given the time constraints of three months. With more time the provider with the lowest score could be worked with and helped to understand why it is important and helped to achieve the five stages of change.

**Question 6: If the intervention did work, what contributed to the intervention's success?**

The intervention did achieve its goals especially of objectives one and two which focused on education. Providers were willing to attend the education sessions in order to receive up to date evidenced based information on diabetic care. They were also willing to attend education sessions about MU and how to utilize the existing EMR system meaningfully. The willingness of the providers was what helped to meet these two objectives. The third objective was also met in the sense that data was monitored to determine the improvement in rates of diabetic preventative care. The objective was to have an improvement in the rates of preventative treatment although the impact was not as large as had hoped for. Provider B had the biggest impact in her rates of diabetic care Provider B was made aware of a complete diabetic examination and was motivated to make the appropriate changes and utilize the EMR system in a meaningful manner. Realizing the financial incentive behind MU also helped to improve provider B's results.

**Question 7: Is the intervention worth sustaining?**

Yes, the project is worth sustaining. The changes that were made to the EMR system are a permanent part of the system and have provided prompts for providers to provide comprehensive diabetic care. Providers are encouraged through the MU of the EMR system to provide up to date diabetic care and ensure that patients receive the recommended preventative care measures (Hogan & Kissam, 2010; Ahmad & Tsang, 2013). Attesting to MU is important to clinical practice and this project can ensure that the objectives are met so that MU can be attested to. In addition through the provision that diabetic patients receive the preventative care it will help to lower the rates of complications and ensure that diabetic patients live a higher quality of life (Gray et al., 2012). The objective is to not only help diabetic patients achieve a higher functioning, but to also improve the quality of longevity of their lives (Gray et al., 2012). It is only through sustaining the project that diabetic patients will receive the recommended care.

This improvement project highlights the need for continued increase in preventative care measures at FMA. In order to sustain the project annual review of ADA treatment standards will be needed in order for the providers to continue to provide the most up to date information about diabetic preventative care. The templates and flowsheets will need to be maintained and edited to reflect the current treatment standards. In addition this project highlighted some important barriers in implementation that will need to ensure that the program is successful to its highest potential. One of the barriers that it highlighted as the willingness of providers to change practice habits. In the context of the Transtheoretical Model of Behavioral change, if a provider is in the pre-

contemplative or contemplative stages, the project will not achieve maximum effectiveness. During these stages providers are either unaware of the need to change, or while aware of the need to change are not at a point where they feel it is necessary to change (Singer, 2007). Providers within these two stages will require more personal attention to help them to progress to the preparation and action phases of change. A second barrier that was highlighted as the general sense of lack of time. The clinic allows 20 minutes for visits. During a visit session there may be four or more disease states that need to be addressed not including any patient concerns, the examination and treatment review with the patient. Providers who are not used to working with template and flowsheets may feel that they take up too much time and be less likely to utilize them. Spending more time with those providers so they can easily utilize the features, might improve the outcomes of the project.

### **Discussion of Findings in Context of Literature and Framework**

The first objective of the project was to educate practice providers on the current ADA treatment standards. The ADA provides up-to-date evidenced based treatment guidelines. The rationale was that through the education of providers on EBP they would receive the most up to date information in order to provide an improved quality of care to patients (Beaser & Brown, 2013; Evans, 2010). Through the education of the providers, they did become aware of the components of a thorough diabetic patient encounter. The providers were able to voice the components after the educational session. The objective was that through the understanding and the implementation of the ADA standards of care, preventative diabetic care would increase as seen in the Gray et al. (2012) article. There

was a 0.89% increase in microalbumin screening, 2.5% increase in dilated eye examinations and a 1.68% increase in monofilament foot examinations. While the providers felt like they would be able to provide better care, it only translated into small improvements. Beaser & Brown (2013) discussed the importance of not only having the knowledge of the practice standards but then translating it into practice. While the providers at RMA had the knowledge only two out of the three seemed to be utilizing it in clinical practice. This was seen as Provider B and Provider C either increased or maintained current recommendations. Provider B had an increase of 8.01% in the rate of diabetic patients receiving microalbumin screenings, an increase of 17.22% receiving eye examinations and finally an increase of 17.64% of patients receiving monofilament foot examinations. Provider B not only attended the sessions, but then translated the knowledge gained into clinical practice. Provider C had higher percentages of foot examinations and dilated eye examinations prior to the intervention and maintained these percentages throughout the intervention period of time. Provider C saw an increase of 1.12% in the patients receiving an annual microalbumin level during the time demonstrating that provider C is starting to work on translating the knowledge of needing microalbumin screening into clinical practice. Provider A actually decreased in the percentages of patients receiving the recommended preventative screening (see Figure 3). Similar results have been seen in other projects where lack of intensification in medication treatment and low percentages of patients receiving preventative care were seen (Beaser & Brown, 2013; Schmittiel et al, 2008). The providers in these studies were aware EBP guidelines, but failed to implement them into clinical practice. The

results were lack of intensification of medication treatment resulting in higher A1C levels as well as diabetic patients not receiving recommend annual screenings.

The second objective was that the education of practice providers on how to use the existing EMR system through education on flowsheets and templates and how they interact in order to improve the number of patients receiving preventative care at RMA. This was intended to help the providers meaningfully use the existing EMR system to enhance and improve the treatment provided to diabetic patients. EMR systems have been used in various settings to increase the rate of diabetic patients who received preventative services (Cebul, Love, Jain & Herbert, 2011; Fleurant et al., 2011; Koopman et al., 2011). The second goal was partially met. Each provider received the instructions on how to use the diabetic template which included prompts to ask and help capture data needed for a complete diabetic visit. They also received instructions on how to use the diabetic flowsheet. They were shown how the template and the flowsheet interacted to ensure ease of use and smooth transitions between the two components of the chart. Despite the demonstration, there were many questions asked over the three month time frame about how to use the templates and flowsheets and how to document annual monofilament examinations. Providers also voiced the complaint about the amount of extra time it took to document the visit. Lack of time seems to be a common theme within primary care (Parchman, Zeber & Palmer, 2010). While the providers were trying to use the EMR system meaningfully, they expressed that it was easier just to free text or to take shortcuts in order to simplify charting and reduce the amount of time it took to complete tasks outside regular business hours.

The third objective was to monitor the utilization of these features to show improvement in the number of patients receiving preventative care recommendations. Providers were monitored and the clinic as a whole was monitored in regards to the progression from three months prior to the implementation of the improvement project to three months after the implementation. As a whole, the rates of patients receiving preventative care measures had minimal improvement (see Figures 1 and 2). Even though providers were reminded about the needed services and were provided with a monofilament in each room rates were only slightly improved. Even when providers were reminded of goals and that the statistics were being monitored, the main complaint was lack of time. He (2011) also encountered this as an issue. He (2011) found that while the PCP may be aware of the need for a service, lack of time led to an in-adherence to the treatment standards.

An impact evaluation was conducted at the conclusion of the program to determine if the project was worth sustaining. Through the analysis of seven questions it was determined that the project would be worth sustaining since there was an increase in the number of patients receiving care. It was determined that the program did achieve its objectives of education in ADA treatment standards, education on the MU of EMR systems in tracking diabetic care and increase in diabetic patients receiving preventative care. The changes to the EMR system were based on EBP and reflect up-to-date standards of care ensure that when the EMR is used meaningfully patients receive the best possible care. One unintended effect that was highlighted was the lack of time within primary care to utilize the EMR system to its full capacity. This was a common complaint

among the providers during the three month improvement project and has been highlighted in studies conducted by Parchman, Zeber & Palmer (2010) and He, (2011) where similar complaints were expressed by providers.

The impact evaluation also highlighted other possible improvement projects for the clinic which included implementation of a diabetic educator, telephone follow-ups (telehealth initiative) and group treatment sessions (Beverly et al., 2012; Currie et al., 2012; Davis et al., 2010). All three initiatives would have required both time and money resources for which the clinic did not have. The MU of the EMR system held the potential to provide the most impact in the setting of a small private practice.

Factors that contributed to the project working included the openness of Provider B to change and Provider C who maintained utilization of MU of the EMR system, willingness to attend educational meetings and proper documentation within the EMR system. Factors that contributed to only a modest increase in number include the perception of lack of time of proper documentation and the lack of incorporation of MU of EMR by Provider A. When using the Transtheoretical Model of Behavioral Change to analyze why the project did not work, it highlights the different stages of behavioral change that each provider was in (Singer, 2007). It highlights that Provider A was likely not even in the pre-contemplative stage and expecting provider A to move through all 5 stages in three months could have been an unrealistic goal (Singer, 2007).



## **Implications**

### **Policy**

Quality of care standards for diabetes is just one of the many disease states targeted through the MU initiative (Ahmad & Tsang, 2013; Reilly & Polifroni, 2012; Swanson, Cowam & Blak, 2011). As legislators examine new health care policies and look at changing laws into how practices are being reimbursed, it is important for them to look at the difficulties and the amount of time providers are spending doing administrative measures like documentation and try not to make demands on providers that will leave them with even less time with patients (McCluskey & Middleton, 2010; Parchman, Zeber & Palmer, 2010). It is difficult to determine what would be a solution to this problem. One solution might be to have committee members spent a day in the primary care setting to appreciate the difficulties of patient treatment and the time constraints experienced. With a better understanding of the demands of the job, more realistic expectations may be developed.

### **Practice**

There are several implications for clinical practice. For the provider it is important that the patient's health care come first. It is important to slow down and ensure that the patient is receiving the best CBP care possible and that the care is documented within the EMR system (He, 2010). It is also important to realize that when using an EMR system, it is there to help with the practice of medicine and through monitoring numbers it can provide encouragement to adhere to treatment standards (Murphy, 2010; Stetson, Ruggiero & Jack, 2010). Providers must not be afraid to embrace technology and realize

that while initially it may take a little investment of time, in the end it will result in better quality of care for the patient (Hogan & Kissam, 2010; Koopman et al., 2011; Fleurant et al., 2011). Providers need to embrace MU and EMR systems are here to stay. It is also important that they take time to learn how to use the EMR system in a way which enhances patient care (Ahmad & Tsang, 2013).

It is also important that providers realize that EBP is an important part of practicing medicine in order to ensure that patients are taken care of (Vratny & Shriver, 2007). Evidence based practice provides rationale for why we provide the care that we provide (Stetson, Ruggiero & Jack, 2010). Unwillingness to incorporate EBP into practice ultimately hurts the patient and can lead to complications that could have been avoided (Evans, 2010; Marrero et al., 2013).

## **Research**

There are many implications for continued research and improvement projects based on the current improvement project. Research needs to continue on the generalizability of legislation into small clinical practices. Research into the utilization of MU and barriers to its implementation into small practice needs to occur. Research also needs to examine the differences between small practices and large practices in how new policies are implemented and are they feasible for small practices to sustain, or do they help to put small practices out of business. Also studies examining the time constraints on primary care providers need to occur. With new policies and new phases of existing policies being phased in, the amount of changes can seem overwhelming and put further time constraints on primary care providers. Research should occur into what can help

ease time constraints for primary care providers. In addition more research into how to improve provider compliance to preventative care for diabetic needs to occur. With the rate of diabetes increasing across the country, it is important to find ways to encourage providers to implement preventative care into practice and to document that this treatment was rendered.

### **Social Change**

Diabetes is a rising epidemic in the United States. It is important that social changes are implemented in order to encourage diabetic patients to receive the preventative care needed (ADA, 2013a). It is important that diabetic patients take charge of their own health. With the ever increasing burden being placed on primary care providers, it is important that patients take charge of their own health and educate themselves on the type of preventative services needed (Currie et al., 2012; He, 2011). If patients are educated and take the initiative at asking for preventative services this could help to reduce the burden of care and the rates of complications for diabetic patients. Initiatives on how to educate patients should be formed and then implemented into the community. It is only through changes and education that the rates of diabetic complications will be reduced.

### **Project Strengths and Limitations**

#### **Strengths**

There are both strengths and limitations to this project. Some of the strengths of this project include the use of evidence based practice standards to guide the education of the providers. All of the providers were education on the 2013 ADA standards. This

allowed for standardization of diabetic care in the clinic. The templates and flowsheets were adapted and built around these standards to help providers to comply with the treatment standards. These same standards are utilized across the United States to provide quality diabetic care (ADA, 2013a). The second strength is that one provider significantly improved her rates of care while a second provider continued with the same rate of care (which initially was higher than the rest of the clinic). This allowed the first provider to achieve a higher rate of preventative diabetic care measures. This demonstrates that when a provider is in the right stage of change, positive changes can occur and health can be impacted. A third strength is that the templates and flowsheets are set up in the EMR system and will remain there. If the project continues within the clinic it will allow for data collection and comparisons can continue to be made to pre and post intervention which could be utilized in the future to show if MU of EMR does make an impact on diabetic preventative care compliance.

### **Limitations**

There are several limitations to this improvement project. One limitation was a provider quit the clinical practice during the project. This led to disqualification of his data from the project. This led to a smaller sample size than prior to the start of the project. This also led to disruption within the clinical setting and hiring of additional providers that had to be trained on the use of the existing EMR system. This led to the focus being taken off the improvement project and onto training new providers for a short period of time. If the interruption had not happened the focus would have been solely on the improvement project which could have resulted in a higher of percentage of diabetic

patients who received preventative care. Another limitation is the time constraints for the project. Three months were allotted for the improvement project. Three months may not be enough time for providers to adapt to the changes or be able to work through all five stages of the Transtheoretical model. Ideally the project would have taken place over 12 month period of time to allow providers to transition through all five stages of the Transtheoretical model (Singer, 2007). A third limitation is the size of the practice. FMA is a small private practice with a patient population of 2300 and a diabetic population of approximately 362 patients. If there were more diabetic patients and providers the numbers might have been higher concerning the number of diabetic patients who received the appropriate preventative care. Finally there is a limitation to utilizing just the Crystal reporting system for data analysis. Providers admitted to not using the EMR system to capturing the CPT codes associated with the preventative services. They reported simply typing the history of present illness (HPI) and the treatment plan into the EMR instead of using the templates. Data was not included if it was not put into the flowsheet where a CPT code was linked to it. The rationale behind not including the data, was that for items simply placed in the chart, they are not reported to Medicare services in the MU attestation data because it does not qualify as MU of the EMR system.

### **Recommendations for Remediation of Limitations in Future Work**

The recommendation is that the existing project continues within FMA and that data continue to be collected over the next nine months to further assess the impact the project makes on the diabetic population over the course of the year. As highlighted in the limitation section, the three month timeline was not enough to allow providers to

adapt to the changes expected of them. It also did not allow for providers in the first two stages (pre-contemplation and contemplation) of behavioral change to transition into the preparation and action phases.

During the project a provider quit the practice. This is not recommended during a quality improvement project. Due to the time constraints on the project, the project proceeded as planned. This was in part due to not knowing when additional providers would be hired. Ideally during an improvement project there would be no disruption of the project and the focus would be centered on the project. A recommendation for future projects would be to discontinue the project until a more stable time within the practice setting. This would allow more focus on the project which could result in better outcomes.

Another recommendation is that practices similar to FMA implement a similar project and the data analyzed in a similar fashion. This can help to determine the impact of MU of an EMR on diabetic preventative care in small private practices. It is only through implementation of these projects that the true impact of MU on diabetic care can be established. Similar improvement projects on use of EMR to ensure that patients receive general preventative care measures such as colonoscopies, pap smears and mammograms should be implemented into clinical practice as well. It is only through preventative services that early detection of complications and cancer can occur and treatment ensues.

## **Analysis of Self**

### **As Scholar**

Throughout the project I have had to constantly switch hats between the roles as a scholar, practitioner and project manager. As a scholar I was constantly looking for ways to implement and explain the importance of evidence based medicine. I utilized the project to explain why diabetic care is essential and why preventative care is needed as well as the rationale behind each recommendation. I also looked for ways to increase compliance to MU objectives and for ways to fully utilize the EMR system. I have developed a quality improvement project that allowed positive clinical changes and reinforced the habits existing habits. I also had to accept that not everyone best is willing to incorporate changes into clinical practice. This was an important lesson to learn. It not only applies to students and scholars but also to patients.

### **As Practitioner**

As a practitioner incorporating the project into clinical practice, I have had to learn that there is a strong patient factor in the success of improvement projects. The practitioner can recommend preventative measures, but it is up to the patient to get these services conducted. I have also had to ensure that I had documented the appropriate referrals and preventative services rendered. If the services were not documented then it was as if they were not done. Documentation is important on many aspects, it not only demonstrates that the services were rendered, but it helps with the reimbursement rate as well as with medical-legal issues. This project has helped to enhance my clinical practice and has helped my patients to feel as if they are being taken care of. It has also expanded

my role within the clinical practice. I am now viewed as a leader and have even been given the title of nurse supervisor within the clinic setting. This was due to management seeing that I am capable of leading improvement projects that enhance clinical practice. This has helped me to achieve my goal of not only managing patients, but expanding my role within the clinic.

### **As Project Developer**

My role as project manager has also helped to achieve a goal of making a positive impact on clinical practice standards. As project manager I had to step outside of my usual clinical role and take on more leadership positions. This has allowed me to be viewed as a leader within the practice. Through the development of technology skills many individuals within the clinic come to me for instructions on how to make changes to the EMR that will benefit clinical practice. I have also been asked to take on more improvement projects for the clinical practice through modification of existing templates and development of more templates.

### **Project and Future Professional Development**

This project did achieve its objective of educating providers on 2013 ADA treatment standards and how to meaningfully utilize an EMR system. This has helped me to achieve an objective of successful implementation of a quality improvement project within the clinical setting. It has allowed me to realize several of my long term goals. The first goal was to achieve my DNP which will be realized in the near future. The second goal was to make a positive impact on clinical practice through providing the means to providers to provide comprehensive diabetic care. This was realized through the



incorporation of the template into clinic practice making it easier for providers to understand what a comprehensive diabetic examination includes. The third goal was to expand my role within the current clinical setting which was realized when I was asked to be nursing supervisor over the four nurses at the clinic.

### **Summary**

Diabetes is an epidemic within the United States (ADA, 2013). The burden of care lies within the primary care setting and with growing demands it is difficult to ensure that diabetic patients receive the care needed (ADA, 2013d). The improvement project was designed to provide education on 2013 ADA treatment standards and education on the use of templates and flowsheets within the existing EMR system in order to improve rates of diabetic preventative care within a small private primary care practice. The project resulted in the adaptation of the templates and flowsheets to reflect ADA standards and the providers were educated on not only the standards but how to meaningfully use the EMR system. The result was a modest improvement in compliance to diabetic preventative care within the clinic.

The main strength of the project was that it utilized evidence based practice standards to make changes to templates and flowsheets in the EMR system to allow for MU. These changes are a permanent part of the EMR system and will be utilized from this point out. They will also be updated annually to reflect current treatment standards. The main limitation to the project was the small size of the clinic and the short period of time to implement the project.

This project raises a question about the impact of MU of an EMR system to positively affect the number of diabetic patients receiving the recommended care. For two providers it served to aid in their treatment of diabetic patients and supports that MU of EMR can impact patient care. There are two main conclusions. The first is that the provider has to be open to change and has to be willing to incorporate change into his/her practice. If they are not willing, then the changes will not take place (Beaser & Brown, 2013). The second conclusion is that in primary care there are a lot of responsibilities and with new changes and policies being implemented daily, it places a large burden on the primary care provider (Parchman, Zeber & Palmer, 2010). Time constraints often get in the way of providing and/or documenting the care that the patient receives (Parchman, Zeber & Palmer, 2010). Policymakers and practitioners both need to examine how to ease the burdens placed upon primary care providers using EMRs in patients with multiple chronic health conditions.

Section 5: Scholarly Product

Meaningful Use of EMR to Improve Diabetic Treatment Compliance of ADA Treatment Standards

Manuscript

Tamara Parrish, BA, MS, DNPc

Patricia Schweickert, RN, MSN, PMC FNP-BC, DNP

Amy Swango-Wilson Ph.D., MSN, RN

Faisal Aboul-Enein D.Ph., MSN, MPH, RN, FNP-BC, ACHE, USPHS

### Abstract

Diabetes affects approximately 10% of the American population with an annual expenditure of approximately \$174 billion dollars. The utilization of electronic medical records (EMR) combined with the meaningful use (MU) initiative may ensure that diabetic patients receive the recommended preventative care. Dorteia Orem's self-care deficit theory and the transtheoretical model of behavior change was utilized to design this quality improvement project. Medical professionals at a small private practice received education on American Diabetic Association (ADA) treatment standards and how to use the EMR system to track patients receiving the recommended diabetes care. The project question examined the effectiveness of provider education on improving ADA treatment standards and on using the EMR system to adhere to MU objectives of providing diabetic preventative care measures of annual dilated eye examinations, annual microalbumin levels, and annual microfilament foot examinations. A convenience sample of 3 providers and 309 patients was used and data were collected on Excel spreadsheets pre and post intervention through the Crystal Reports system to assess the percent improvement in the rates of preventative care. An impact evaluation revealed that the project achieved its objectives showing a 5.07% increase in diabetic preventative care. The program evaluation determined that the project is worth sustaining in the clinical setting as it provides a practical and economical way of improving diabetic patient care. This improvement project suggests that MU and adherence to ADA treatment standards has the potential to make a positive social change through increasing the amount of diabetic patients receiving preventative care.

## **Introduction**

Diabetes affects 25.8 million Americans account for an annual expenditure of 174 billion dollars in direct and indirect costs (CDC, 2012; ADA, 2013a). According to the Centers for Disease Control (CDC), a large portion of diabetes related costs occur in treatment of diabetes related complications (CDC, 2012). Complications associated with diabetes include, but are not limited to, lower limb ulcerations, lower limb amputations, peripheral neuropathy, peripheral vascular disease, nephropathy, retinopathy, blindness, myocardial infarctions, cerebral vascular accidents, and gastro paresis (ADA, 2013c). Both the CDC and the ADA have stated that the key to reduction in medical cost and in reducing both the morbidity and mortality associated with diabetes is to reduce the complications related to diabetes (CDC, 2012; ADA, 2013c). Despite evidenced based practice protocols, the rate of diabetic patients that receive preventative care services of annual microalbumin, annual dilated eye examination and annual monofilament foot check remains low (CDC, 2012). According to the Department of Health and Human Services, of 46 reporting states only 62.8% of diabetic patients received the annual dilated eye examination and only 67.5% received the annual foot examination (DHHS, 2012). Ways to improve compliance with the preventative services need to be examined.

The first way is to educate providers on current treatment standards of diabetes. Through understanding the reason behind preventative services, and the current recommendations on diabetic preventative care the goal is improve the compliance rates of providers ordering and providing the preventative services (Beaser & Brown, 2013;

Gray et al, 2012;). The second projected way to improve compliance is through the MU of an Electronic Medical Recording system (EMR) (Centers for Medicare Services, 2013). The goals of MU include the utilization of existing tools within an EMR system to identify patients who have not received the recommended services and then to order through the use of the system these services (Hogan & Kissam, 2010).

Diabetes care is a complex interchange between the provider and the patient and with the majority of diabetes being managed at the primary care level it is important that providers utilize all tools available to them to ensure that diabetic patients receive complete care (Beaser & Brown, 2013; Gray et al, 2012; He, 2011) Grey et al. (2012) used a thirty year simulation model to show that if all diabetic patients received the recommended preventative care it could add an estimated 16% increase in life years and a 23% reduction in fifteen year mortality. With the Primary Care Provider (PCP) having to address many issues at one visit, lack of time has been cited as an issue (He, 2011). It is important that the provider streamline the patient visit and utilize reminder tools to aid in patient treatment. Several studies have highlighted that if the EMR is utilized to its full extent compliance with diabetic treatment standards improves and documentation that the services have been done improves as well (Cebul et al., 2011; Fleurant et al., 2011;, Sperl-Hillen et al., 2010; Weber, Bloom, Pierdon & Wood, 2007;). These studies took place in larger practices and a literature review failed to result in studies that examined the impact of MU of EMR in a small private practice.

Dorthea Orem's self-care deficit theory and the Transtheoretical Model of Behavioral Change were utilized to develop a quality improvement project to examine

the effect of education and implementation of ADA treatment standards through the MU of an EMR system in a small private practice. The goals of the improvement project were to educate providers on the current ADA treatment standards, to educate providers of how to utilize the current EMR system to provide comprehensive diabetic care and to help providers realize the full potential and impact MU can make on a private practice. The main objective of the improvement project was to improve the rates of diabetes receiving the preventative measures of dilated eye examinations, annual microalbumin levels and annual monofilament foot examinations through the education of providers and utilization of the EMR system in a meaningful manner.

### **Methods**

The design of the study was a quality improvement project concluding with an impact evaluation to determine the effectiveness of the intervention. Prior to the project starting permission for the improvement project was obtained from the practice owner and the office manager. The project was a multiple component project. The first component was the development of an educational program centered on the ADA 2013 treatment standards for diabetic patients. The second component was the adaptation of the current EMR templates and flowsheets centered on diabetes care to reflect the current ADA standards of care. The third component was to educate the providers on how to utilize this in clinic practice. The fourth component consisted of provision of monofilaments into each examination room so the providers would have the proper tools needed to provide preventative care. Finally providers were reminded monthly about the expectations of the project.

The subject of the study was a small private practice consisting of approximately 2,300 patients with a population of approximately 362 diabetic patients. The intervention focused on targeting the four providers within the clinic and the diabetic patients who received preventative care. During the course of the intervention one of the providers terminated their employment leaving three providers. The clinic was targeted because of its size as well as because of its willingness to participate in measures that would result in improved patient care. Prior to implementation, the project was explained to the owner and office manager and they agreed to participate in the improvement project. The sample size of diabetic patients was determined through utilization of the sample size calculator located at the creative research center website where it was determined that a sample size of at least 329 would be needed to produce significant results (Creative Research Center, 2013).

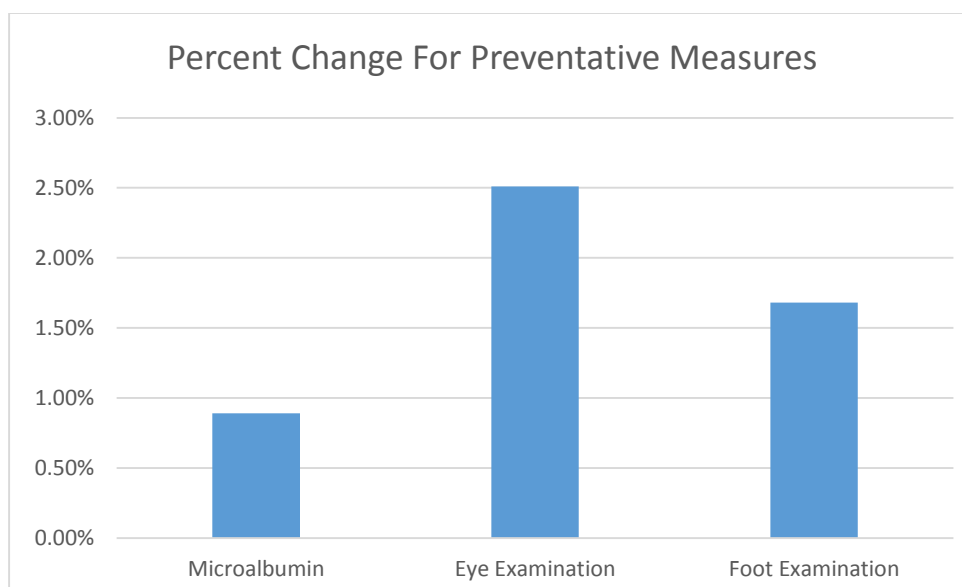
The existing EMR system eMDS was utilized for the improvement project. Part of the EMR system is a data collecting tool called Crystal Reports. This is the system that is utilized to report numbers to the government in order to attest to MU. The System cross matches ICD-9 to CPT codes and referral codes that are utilized to capture services rendered or referrals made. It also links ICD-9 codes to data imputed into the flowsheet documenting that the patient had received preventative measures. This produces the number of patients receiving the intervention, the number eligible and the percentage of patients who received the screening. The data is collected in such a way that it does not reveal patient names, thus protecting patient names from being published.



Data was collected through the utilization of the Crystal Reporting System, on the three months prior to the intervention and examined the percentage of diabetic patients who had received or had been referred out to receive the preventative measures of annual dilated eye examination, annual monofilament foot examination and annual microalbumin levels. The data was then collected on the three month after the invention to examine the percentage of improvement seen by each individual provider as well as clinic-wide. An impact evaluation was conducted upon completion of the project to determine the impact on the clinic as well as recommendations of how to improve the project and if the project should continue within the clinic. Additional data was collected through casual conversations with providers and questions asked by providers throughout the course of the improvement project.

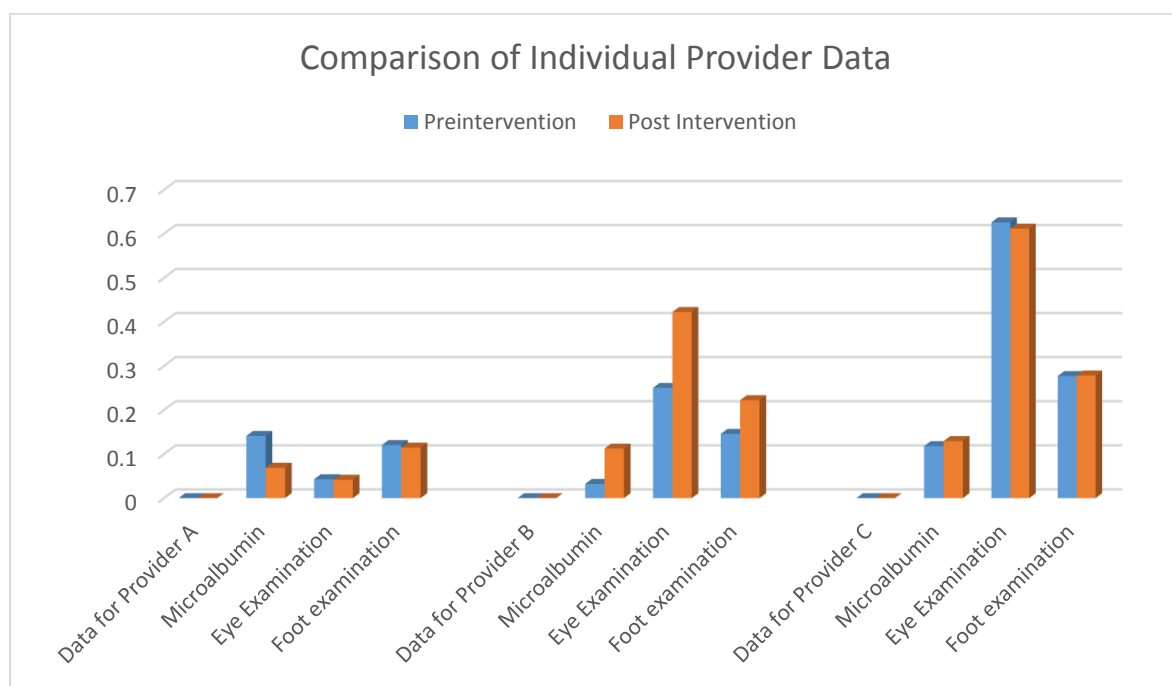
## Results

The data for the clinic produced minimal improvement in the rates of diabetic patients who received the recommended Services (see Figure 1).



*Figure 1.* Percentage of Change from pre to post intervention on the measures of Microalbumin, dilated eye examinations and annual microfilament foot examinations. .

When examining each individual provider the results were varied. Provider A showed a decline in percentages (see Figure 2), Provider B showed drastic improvement almost doubling the amount diabetic patients who received the care (see Figure 2) and Provider C showed maintenance of existing percentages (see Figure 2).



*Figure 2:* Comparison of Provider Data pre and Post Intervention

Through the utilization of an impact evaluation it was determined that the project achieved its objectives. The first objective was to educate providers on 2013 ADA standards of care. The second goal was to educate providers on how to use the diabetic

templates and flowsheets to track diabetic care. These goals were achieved through conduction of educational sessions and the providers expressing understanding of the treatment standards and how to use the EMR system. The third goal was to see an improvement in the percentages of patients who received diabetic preventative care. This was achieved as 5.07% of the patients receiving care that had not received it prior to the intervention.

### **Discussion**

The underlying objectives of education about ADA treatment standards and how to use the EMR system meaningfully were met. The providers could verbalize the standards and could demonstrate how to utilize the system as it was intended. The objective of an increase the percentage of patients receiving diabetic preventative care standards of annual dilated eye examinations, annual monofilament foot examinations and microalbumin screening was achieved as well. The percentages of increase were small, however (as seen in Figure 1). These results differed from results seen in a similar study by Weber, Bloom, Pierdon and Wood (2007), where they saw an increase of approximately 24% of patients who received preventative care measure of an annual influenza vaccine.

There were several overlying themes when the impact evaluation was conducted. Similar to that witnessed by He (2011) and as illustrated by Parchman, Zeber & Palmer (2010), there was an expressed lack of time within primary care. Primary care consists of providing care for many disease states at one visit, not just one state. It can also include answering question and addressing any new problems that have risen since the last visit

and all of this must be done within a 15-20 minutes visit span. With other aspects of MU being implemented in addition to the diabetic preventative service part of the MU initiative, the question becomes are providers being asked to do too much at an office visit.

The implications of this study suggest that small primary care offices need to be the focus of future research in the feasibility of implementing initiatives such as MU. MU as a theory and when utilized properly in practice, can make a great impact on patient care (Cebual Love, Jain & Herbert, 2011; Koppman et al., 2011). This has been seen when implemented in larger practices. The question remains what about smaller practices. Similarly the way this program is phased in and the pace of such programs needs to be examined as well. For providers the implications are to have an open mind about embracing the MU initiative and to realize the importance of the MU of an EMR system. If minds are open to change then the changes are more likely to take place ( Ahmad & Tsang, 2013).

There are some limitations to this project. The first limitation was that one of the provider terminated his employment at the clinic so his data set could not be utilized raising the question would the improvement clinic-wide been better with his data set. This also led to the disruption in the clinical practice which further contributed to a time issues. Another limitation was the amount of time allotted for the improvement project which was a three month period of time. If this project had taken place over a year, the statistics might have looked better. A third limitation was utilizing just the Crystal Reporting System for Data analysis. One of the providers reported to not using the EMR

system to capture the CPT codes associated with the services leading to this data not being captured. This data was not included in the statistics for the clinic because it is data that also would not be reported when attesting to MU.

The question arises about the generalizability of the project. This was an improvement project targeting a small practice using e-MDs EMR system. This project might not be able to be generalized to every small practice. It does raise a question about the feasibility of providers in small primary care practices and their ability to incorporate all the new regulations that are being placed on primary care providers.

#### References

- ADA (2013a). *Fast Facts: Data and Statistics about Diabetes*. Retrieved from [professional.diabetes.org/facts](http://professional.diabetes.org/facts).
- ADA (2013b). Diagnosis and classification of diabetes mellitus. *Diabetes Care*, 36 (S1), S4-S65. doi: 10.2337/dc13-S067
- Ahmad, F. & Tsang, T. (2013). Diabetes prevention, health information technology and meaningful use. *American Journal of Preventative Medicine* 44(4s4), S357-S363. doi: 10.1016/j.amepre.2012.12.020
- Beaser, R. & Brown, J. (2013). Preventive intervention in diabetes a new model for continuing medical education. *American Journal of Preventative Medicine*, 44(4S4): S394-399). doi: 10.1016/j.amepre.2013.01.003

- Cebul, R., Love, T., Jain, A., & Herbert, C. (2011). Electronic health records and quality of diabetes care. *The New England Journal of Medicine*, 365 (9), 825-833.  
doi:10.1056/NEJMsa1108519
- Centers for Disease Control (CDC). (2012a). *National diabetes fact sheet, 2011*.  
Retrieved from <http://www.cdc.gov/diabetes/pubs/factsheet11.htm>
- Centers for Medicare Services (CMS). (2013). *Meaningful Use*. Retrieved from  
[http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Meaningful\\_Use.html](http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Meaningful_Use.html)
- Creative Research Center. (2013). *Sample Size Calculator*. Retrieved from  
<http://www.surveysystem.com/sscalc.htm#one>
- Department of Health and Human Services. (2012). *Percentage of Preventive Care Practices for Adults Age  $\geq 18$  years of age*. Retrieved from:  
[www.cdc.gov/diabetes/statistics/preventive/fALLPRACTICES.htm](http://www.cdc.gov/diabetes/statistics/preventive/fALLPRACTICES.htm).
- Fleurant, M., Kell, R., Love, J., Jenter, C., Volk, L, Zhang, F., Bates, D. & Simon, S. (2011) Massachusetts E-health project increased physicians' ability to use registries, and signals progress toward better care. *Health Affairs*, 30(7), 1256-1264. doi:10.1377/hlthaff.2010.1020
- Gray, B., Schuetz, A., Weng, W., Peskin, B., Rosner, B. & Lipner, R. (2012). Physicians' actions and influence, such as aggressive blood pressure control, greatly improve the health of diabetes patients. *Health Affairs*, 31(1), 140-149.  
Retrieved from: <http://www.healthaffairs.org/>

- He, X. (2011). Diabetes preventive services and policy implications in the US. *Diabetes Care*, 34(10), 8-13. doi: 10.2337/dc10.1351
- Hogan, S. & Kissam, S. (2010). Measuring meaningful use. *Health Affairs*, 29(4), 601-606. doi: 10.1377/hlthaff.2009.1023
- Koopman, R., Kochendorfer, K., Moore, J., Mehr, D., Wakefield, D., Yadamsuren, B., Coberly, J., Kruse, r., Wakefield, B., & Belden, J. (2011). A diabetes dashboard and physician efficiency and accuracy in accessing data needed for high quality diabetes care. *Annals of Family Medicine*, 9(5), 398-405. Retrieved from [www.annfammed.org](http://www.annfammed.org).
- Parchman, M., Zeber, J. & Palmer, R. (2010). Participatory decision making, patient activation ,medication adherence, and intermediate clinical outcomes in type 2 diabetes: A STARNet study. *Annals of Family Medicine*, 8(5), 410-416. Retrieved from [www.annfammed.org](http://www.annfammed.org).
- Sperl-Hillen, J. ,Averbeck, B., Palattao, K., Amundson, J., Ekstrom, H, Rush, R., & O-Conner, P. (2010) Outpatient EHR-based diabetes clinical decision support that works: lessons learned from implementing diabetes wizard. *Diabetes Spectrum*, 23(3), 150-154. Retrieved from [spectrum.diabetesjournals.org/](http://spectrum.diabetesjournals.org/)
- Weber, V., Bloom, F., Pierdon, S. & Woods, C (2007). Employing the electronic health record to improve diabetes care: A Multifaceted intervention in an integrated delivery system. *Journal of General Internal Medicine* 23(4), 379-382. doi: 10.1007/s11606-007-0439-2.

## References

- American Diabetic Association. (2013a). *Fast facts: Data and statistics about diabetes*. Retrieved from <http://www.professional.diabetes.org/facts>
- American Diabetic Association. (2013b). Executive summary: Standards of medical care in diabetes—2013. *Diabetes Care*, 36(S1), S4-S65. doi:10.2337/dc13-S004
- American Diabetic Association. (2013c). Diagnosis and classification of diabetes mellitus. *Diabetes Care*, 36(S1), S4-S65. doi:10.2337/dc13-S067
- American Diabetic Association. (2013d). National standards for diabetes self-management education and support. *Diabetes Care*, 36(S1), S4-S65. doi:10.2337/dc13-S100
- Agency for Healthcare Research and Quality. (2013). *Closing the quality gap: A critical analysis of diabetes care strategies*. Retrieved from [www.ahrq.gov](http://www.ahrq.gov)
- Ahmad, F. & Tsang, T. (2013). Diabetes prevention, health information technology and MU. *American Journal of Preventative Medicine* 44(4s4), S357-S363. doi:10.1016/j.amepre.2012.12.020
- Akyol, A.D., Cetinkaya, Y., Bakan, G., Yarah, S., Akkus, S. (2007). Self-care agency and factors related to this agency among patients with hypertension. *Journal of Clinical Nursing* 16, 679-687. doi:10.1111/j.1365-2702.2006.01565.x
- Andres, A., Gomez, J., & Saldana, C. (2008). Challenges and applications of the transtheoretical model in patients with diabetes mellitus. *Dis Manage Health Outcomes*, 16(1), 31-46. doi:1173-8790/08/0001-0031/\$48.00/0



- Beaser, R. & Brown, J. (2013). Preventive intervention in diabetes a new model for continuing medical education. *American Journal of Preventative Medicine*, 44(4S4), S394-399. doi:10.1016/j.amepre.2013.01.003
- Beecher, G. & Appel, S. (2013). An algorithm for care managing type 2 diabetes. *Nursing*, 43(6), 14-17. doi:10.1097/01.NURSE.0000427993.46812.c3
- Bernstein, K. (2007). EHRs can boost compliance. *Health Management Technology*, 28(5), 22-24. Retrieved from <http://www.healthmgtech.com/>
- Beverly, E., Ganda, O., Ritholz, M., Lee, Y, Brooks, K., Lewis-Schroeder, N., . . . Weinger, K. (2012). Look who's not talking: Diabetic patients' willingness to discuss self-care with physicians. *Diabetes Care*, 35, 1466-1472. doi:10.2337/dc11-2422
- Blumenthal, D., & Tavenner, M. (2010). The "meaningful use" regulation for electronic health records. *The New England journal of Medicine*, 363(6), 501-504. doi:10.1056/NEJMp1006114
- Burns, N & Grove, S. (2009). In *The practice of nursing research: Appraisal, synthesis, and generation of evidence* (6th ed.). St. Louis, MO: Saunders Elsevier
- Campbell, J. & Hilleman, D. (2010). Reducing cardiovascular risk in patients with type 2 diabetes: management of dyslipidemia. *Formulary*, 45, 124-134. Retrieved from [www.formularyjournal.com](http://www.formularyjournal.com)
- Cebul, R., Love, T., Jain, A., & Herbert, C. (2011). Electronic health records and quality of diabetes care. *The New England Journal of Medicine*, 365(9), 825-833. doi:10.1056/NEJMsal108519

- Centers for Disease Control and Prevention. (2012). *National diabetes fact sheet, 2011*. Retrieved from <http://www.cdc.gov/diabetes/pubs/factsheet11.htm>
- Centers for Medicare Services. (2013). *Meaningful Use*. Retrieved from [http://www.cms.gov/Regulations-andGuidance/Legislation/EHRIncentivePrograms/Meaningful\\_Use.html](http://www.cms.gov/Regulations-andGuidance/Legislation/EHRIncentivePrograms/Meaningful_Use.html)
- Clancy, D., Haung, P., Okonofua, E., Yeager, D., & Margruder, K. (2007). Group visits: Promoting adherence to diabetes guidelines. *Society of General Internal Medicine, 22*, 620-624. doi:10.1007/s11606-007-0150-3.
- Coleman, K., Reiter, K., Fulwiler, D. (2007). The impact of pay-for-performance on diabetes care in a large network of community health centers. *Journal of Health Care for the Poor and Underserved, 18*, 966-983. Retrieved from: [https://www.press.jhu.edu/journals/journal\\_of\\_health\\_care\\_for\\_the\\_poor\\_and\\_underserved/](https://www.press.jhu.edu/journals/journal_of_health_care_for_the_poor_and_underserved/)
- Creative Research Center. (2013). *Sample Size Calculator*. Retrieved from <http://www.surveysystem.com/sscalc.htm#one>
- Currie, C., Peyrot, M., Morgan, C., Poole, C., Jenkins-Jones, S., Rubin, R., . . . Evans, M. (2012). The impact of treatment noncompliance on mortality in people with type 2 diabetes. *Diabetes Care, 35* (6), 1279-1284. doi:10.2337/dc11-1277
- Davis, R., Hitch, A., Salaam, M., Herman, W., Zimmer-Galler, I. & Mayer-Davis (2010). Telehealth improves diabetes self-management in an underserved community. *Diabetes Care, 33*(8), 1712-1717. doi:10.2337/dc09-1919

- Environmental Protection Agency. (2009). *Guidelines for Evaluating an EPA Partnership Program*. Retrieved from <http://www.epa.gov/evaluate/pdf/tools/guidelines-eval-epa-partnership-programs.pdf>
- Evans, M. (2010). Evidence based practice protocol to improve glucose control in individuals with type 2 diabetes mellitus. *Medsurg Nursing, 19* (6), 317-322.
- Fawcett, J. & Garity, J. (2009). Chapter 1: Research and evidence-based nursing practice. In *Evaluating Research for Evidence-Based Nursing*, (pp. 3-20). Philadelphia, PA: F.A. Davis.
- Fleurant, M., Kell, R., Love, J., Jenter, C., Volk, L, Zhang, F., . . . Simon, S. (2011) Massachusetts E-health project increased physicians' ability to use registries, and signals progress toward better care. *Health Affairs, 30*(7), 1256-1264. doi:10.1377/hlthaff.2010.1020
- Fox, A. (2010). Intensive diabetes management: Negotiating evidence-based practice. *Canadian Journal of Dietetic Practice and Research, 71*(2), 62-75. doi:10.3148/71.2.2010.62
- Gibson, T., Mahoney, J., Rangelhell, K., Cherney, B., & McElwee, N. (2011). Value-based insurance plus disease management increased medication use and produced savings. *Health Affairs, 30*(1), 100-108. doi:10.1377/hlthaff.2010.0896
- Gray, B., Schuetz, A., Weng, W., Peskin, B., Rosner, B. & Lipner, R. (2012). Physicians' actions and influence, such as aggressive blood pressure control,

greatly improve the health of diabetes patients. *Health Affairs*, 31(1), 140-149.

Retrieved from: <http://www.healthaffairs.org/>

Gray, P., Drayton-Brooks, S., & Williamson, K. (2013). Diabetes follow-up support for patients with uncontrolled diabetes. *The Nurse Practitioner*, 38(4), 49-53.

doi:10.1097/01.NPR.0000427609.76270.93

He, X. (2011). Diabetes preventive services and policy implications in the US. *Diabetes Care*, 34(10), 8-13. doi:10.2337/dc10.1351

Hodges, B. & Videto, D. (2011). *Assessment and planning in health programs* (2nd ed.). Sudbury, MA: Jones & Bartlett Learning.

Hogan, S. & Kissam, S. (2010). Measuring meaningful use. *Health Affairs*, 29(4), 601-606. doi:10.1377/hlthaff.2009.1023

Hoskins, T. (2013). *Parametric and nonparametric: Demystifying the terms*. Retrieved from <http://www.mayo.edu/mayo-edu-docs/center-for-translational-science-activities-documents/berd-5-6.pdf>

Jacobs-van Der Bruggen, M., Baal, P., Hoogenveen, R., Feenstrea, T., Briggs, A., Lawson, K., . . . Baan, C. (2009). Cost-effectiveness of lifestyle modification in diabetic patients. *Diabetes Care*, 32(8), 1453-1458. doi:10.2337/dc09-0363

Jimenez-Garcia, R., Esteban-Hernandez, J., Hernandez-Barrera, V., Jimenez-Trujillo, I., Lopez-de-Andres, A., Garrido, P. (2011). Clustering of unhealthy lifestyle behaviors is associated with non-adherence to clinical preventive recommendations among adults with diabetes. *Journal of Diabetes and the Complications*, 25, 107-113. doi:10.1016/j.jdiacomp.2010.04.002

- Johnson, P. & Raterink, G. Implementation of a diabetes clinic-in-a-clinic project in a family practice setting: using the plan, do study act model. *Journal of Clinical Nursing*, 18, 2096-2103. doi:10.1111/j.1365-2702.2008.02774.x.
- Konradsdottir, E. & Svavarsdottir, E. (2011). How effective is a short-term educational and support intervention for families of an adolescent with type 1 diabetes. *Journal for Specialists in Pediatric Nursing*, 16, 295-304. doi:10.1111/j.1744-6155.2011.00297.x.
- Koopman, R., Kochendorfer, K., Moore, J., Mehr, D., Wakefield, D., Yadamsuren, B., . . . Belden, J. (2011). A diabetes dashboard and physician efficiency and accuracy in accessing data needed for high quality diabetes care. *Annals of Family Medicine*, 9(5), 398-405. Retrieved from [www.annfamned.org](http://www.annfamned.org).
- Kumar, C. (2007). Application of Orem's self-care deficit theory and standardized nursing languages in a case study of a woman with diabetes. *International Journal of Nursing Terminologies and Classifications* 18(3): 103-110. Retrieved <http://www.nanda.org/nanda-international-journal-of-nursing-knowledge.html>
- Markhorst, J., Martirosyan, L, Calsbeek, H., & Braspenning, J. (2012). Stakeholders' perspectives on quality indicators for diabetes care: a qualitative study. *Quality in Primary Care*, 20, 253-261. Retrieved from <http://www.radcliffe-oxford.com.ezp.waldenulibrary.org>.
- Marrero, D., Ard, J., Delamater, A., Peragallo-Dittro, V., Mayer-Davis, E., Nwankwo, R., & Fisher, E. (2013). Twenty-first century behavioral medicine: A context for

empowering clinicians and patients with diabetes. *Diabetes Care*, 36 (2), 463-470.

doi:10.2337/dc12-2305

McCluskey, A. & Middleton, S. (2010). Delivering an evidence-based outdoor journey intervention to people with stroke: Barriers and enablers experienced by community rehabilitation teams. *BioMed Central Health Services Research*, 10 (18), 1-15. Retrieved from <http://www.biomedcentral.com/1472-6963/10/18>.

Miller, R. & Sim, I. (2004). Physicians' use of electronic medical records: Barriers and solutions. *Health Affairs*, 23(2). 116-126. Retrieved from [www.healthaffairs.org](http://www.healthaffairs.org).

Moran, K. Burson, R., Critchett, J. & Olia, P. (2011). Exploring the cost and clinical outcomes of integrating the registered nurse-certified diabetes educator into the patient-centered medical home. *The Diabetes Educator*, 37, 780-793.

doi:10.1177/0145721711423979

Murphy, J. (2010). The journey to meaningful use of electronic health records. *Nursing Economics* 28(4). 263-286. Retrieved from <http://www.nursingconomics.net/cgi-bin/WebObjects/NECJournal>.

Nam, S., Chelsa, C., Stotts, N., Kroon, L., & Janson, S. (2011). Barriers to diabetes management: Patient and provider factors. *Diabetes Research and Clinical Practice*, 93, 1-9. doi:10.1016/j.diabres.2011.02.002

O'Connor, P. (2010). Using electronic health records to improve outpatient diabetes care. *Diabetes Spectrum*, 23(3), 146-149. Retrieved from [spectrum.diabetesjournals.org/](http://spectrum.diabetesjournals.org/)

- O'Connor, P., Bodkin, N., Fradkin, J., Glasgow, R., Greenfield, S., Gregg, E., . . .  
 Wysham, C. (2011). Diabetes performance measures: Current status and future directions. *Diabetes care*, *34*, 1651-1659. doi:10.2337/dc11-0735
- Palacio, C., Harrison, J.P., & Garets, D. (2010). Benchmarking electronic medical records initiatives in the US: A conceptual model. *Journal of Medical Systems*, *34*. 273-279. doi:10.1007/s10916-008-9238-5
- Parchman, M., Zeber, J. & Palmer, R. (2010). Participatory decision making, patient activation ,medication adherence, and intermediate clinical outcomes in type 2 diabetes: A STARNet study. *Annals of Family Medicine*, *8*(5), 410-416.  
 Retrieved from [www.annfammed.org](http://www.annfammed.org).
- Pilot, D. (2010). *Statistics and Data Analysis for Nursing Research* (2nd ed.). Upper Paddle River, NJ: Pearson Education Inc.
- Ratner, R. (2011). Diabetes management in the age of national health reform. *Diabetes Care*, *34*, 1054-1056. doi:10.2337/dc10-1987
- Reilly, C.S. & Polifroni, E.C. (2012). Meaningful use of EHRs. *Connecticut Nursing News* *84*(4), 1, 10-11. Retrieved from <http://www.ctnurses.org/>
- Sales, A., Tipton, E., Levine, D., Houston, K., Allison, J. & Kiefe, C. (2008). Are co-morbidities associated with guideline adherence? The MI-plus study of medicare patients. *Journal of General Internal Medicine*, *24*(11), 1205-1210.  
 doi:10.1007/s11606-009-1096-4
- Schmittiel, J., Uratsu, C., Karter, A., Heisler, M, Subramanian, U., Mangione, C., & Selby, J. (2008). Why don't diabetes patients achieve recommended risk factor

- targets? Poor adherence versus lack of treatment intensification. *Journal of General Internal Medicine*, 23(5), 588-594. doi:10.1007/s11606-008-0554-8
- Shen, H., Edwards, H., Courtney, M., McDowell, J. & Wu., M. (2012). Peer-led diabetes self-management programme for community-dwelling older people in China: Study protocol for a quasi-experimental design. *Journal of Advanced Nursing*, 68(12). doi:10.1111/j.1365-2648.2012.06059.x
- Singer, E.A. (2007). The transtheoretical model and primary care: “The times they are a changing””. *Journal of the American Academy of Nurse Practitioners* 19(1), 11-14. doi:10.1111/j.1745-7599.2006.00189.x
- Sperl-Hillen, J. ,Averbeck, B., Palattao, K., Amundson, J., Ekstrom, H, Rush, R., & O-Conner, P. (2010) Outpatient EHR-based diabetes clinical decision support that works: lessons learned from implementing diabetes wizard. *Diabetes Spectrum*, 23(3), 150-154. Retrieved from [spectrum.diabetesjournals.org/](http://spectrum.diabetesjournals.org/)
- Sousa, V., Hartman, W., Miller, E. & Carroll (2009). New measures of diabetes self-care agency, diabetes self-efficacy, and diabetes self-management for insulin-treated individuals with diabetes. *Journal of Clinical Nursing*, 18, 1305-1312. doi:10.1111/j.1365-2702.2008.02729.x
- Stetson, B., Ruggiero, L., & Jack, L. (2010). Strategies for improving the acquisition and integration of evidence into diabetes care. *Diabetes Spectrum*, 23(4), 246-253. Retrieved from [spectrum.diabetesjournals.org/](http://spectrum.diabetesjournals.org/)



- Swanson, M. Cowan, J. & Blake, R. (2011). Preparation for stage 1 meaningful use attestation as an eligible hospital. *ANIA-Caring*, 26(2), 10-16. Retrieved from [www.ANAI.org](http://www.ANAI.org)
- Terry, A.J. (2012). Developing the Researchable Problem. *Clinical research for the doctor of nursing practice* (pp.21-29). Sudbury, MA: Jones & Bartlett Learning.
- The Organization for Economic Cooperation and Development. (n.d.). *Outline of principles of impact evaluation*. Retrieved from <http://www.oecd.org/development/evaluation/dcdndep/37671602.pdf>
- The World Bank. (2013). *Overview of impact evaluation*. Retrieved from <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOV.html>.
- Traylor, A., Schmittiel, J., Uratsu, C., Mangione, C., & Subramanian, U. (2010). Adherence to cardiovascular disease medications: Does patient-provider race/ethnicity and language concordance matter? *Journal of General Internal Medicine*, 25(11), 1172-1177. doi:10.1007/s11606-010-1424-8
- U.S. Department of Health and Human Services. (2010). *Health People 2020*. Retrieved from [http://www.healthypeople.gov/2020/TopicsObjectives2020/pdfs/HP2020\\_brochure.pdf](http://www.healthypeople.gov/2020/TopicsObjectives2020/pdfs/HP2020_brochure.pdf).
- U.S. Department of Health and Human Services. (2012). *Percentage of Preventive Care Practices for Adults Age  $\geq$  18 years of age*. Retrieved from: [www.cdc.gov/diabetes/statistics/preventive/fALLPRACTICES.htm](http://www.cdc.gov/diabetes/statistics/preventive/fALLPRACTICES.htm).

- Vratny, A. & Shriver, D. (2007). A conceptual model for growing evidence-based practice. *Nursing Administrating Quarterly*, 31(2), 162-170.  
doi:10.1097/01.NAQ.0000264866.79711.08
- Weber, V., Bloom, F., Pierdon, S. & Woods, C (2007). Employing the electronic health record to improve diabetes care: A Multifaceted intervention in an integrated delivery system. *Journal of General Internal Medicine* 23(4), 379-382.  
doi:10.1007/s11606-007-0439-2
- Wilson, F., Baker, L.M., Nordstrom, C.K., Legwang, C. (2008). Using the teach-back and orem's self-care deficit nursing theory to increase childhood immunization communication among low-income mothers. *Issues in Comprehensive Pediatric Nursing* 31: 7-22. doi:10.1080/01460860701877142
- World Health Organization. (2013). *Diabetes fact sheet*. Retrieved from [www.who.int/mediacentre/factsheets/fs312/en/index.html](http://www.who.int/mediacentre/factsheets/fs312/en/index.html).
- Wu, S., Liang, S., Wang, T., Chen, M., Jian, Y., Cheng, K. (2011). A self-management intervention to improve quality of life and psychosocial impact for people with type 2 diabetes. *Journal of Clinical Nursing*, 20, 2655-2665. doi:10.1111/j.1365-2702.2010.0394.x
- Zhang, X., Williams, D., Beckles, G., Gregg, E., Barker, L, Luo, H, . . . Saaddine, J.(2009). Diabetic retinopathy, dilated eye examination, and eye care education among African Americans, 1997-2004. *Journal of the National Medical Association*, 101 (10), 1015-1021. Retrieved from <http://search.proquest.com/docview/214041270?accountid=14872>

## Appendix A: Excel Data Collection Template

<b>Column1</b>	<b>Column2</b>	<b>Column3</b>	<b>Column4</b>	<b>Column5</b>	<b>Column6</b>	<b>Column7</b>
	Pre-intervention	Possible	Percent Receiving intervention	Post Intervention	Possible	Percent Receiving Intervention
Microalbumin						
Eye Examination						
Foot examination						

## Appendix B: Sample Consent Form

**Initiative/Program/Intervention Oversight and Data Use Agreement with Employer**

Practice Name Here

Address Goes Here

March 4<sup>th</sup>, 2014

Our employee, Student Parrish, is leading a Diabetic Quality Improvement initiative which will be conducted under our organization's supervision within the scope of our standard operations. We understand that Tamara A. Parrish seeks to write about this initiative as part of a doctoral project for Walden University.

The Walden University Institutional Review Board (IRB) will be responsible for ensuring that the student's published project meets the university's ethical standards regarding confidentiality (outlined below). All other aspects of the implementation and evaluation of the initiative are the responsibility of the student, within her role as our employee.

The doctoral student will be given access to a Limited Data Set ("LDS") for use in the doctoral project according via the ethical standards outlined below.

Definitions. *Unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the "HIPAA Regulations" codified at Title 45 parts 160 through 164 of the United States Code of Federal Regulations, as amended from time to time.*

Preparation of the LDS. *Data Provider shall prepare and furnish to Data Recipient a LDS in accord with any applicable HIPAA or FERPA Regulations*

Data Fields in the LDS. *No direct identifiers such as names may be included in the Limited Data Set (LDS). In preparing the LDS, Data Provider or shall include the data fields specified as follows, which are the minimum necessary to accomplish the research: Data to include: Number of diabetic patients seen within the three months of the quality improvement project and the three months prior to the quality improvement project; Data concerning the number of the diabetic patients who received a monofilament foot examination within the three months of the improvement project and three months prior, data concerning the number*

of diabetic patients who received or who were referred to receive a diabetic dilated eye examination during the three month improvement project and three months prior to the project; number of patients who received a microalbumin urine screen during the three months of the project and three months prior to the project.

Responsibilities of Data Recipient. *Data Recipient agrees to:*

*Use or disclose the LDS only as permitted by this Agreement or as required by law;*

*Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;*

*Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;*

*Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and*

*Not use the information in the LDS to identify or contact the individuals who are data subjects.*

Permitted Uses and Disclosures of the LDS. *Data Recipient may use and/or disclose the LDS for its research activities only.*

Term and Termination.

Term. *The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS, unless sooner terminated as set forth in this Agreement.*

Termination by Data Recipient. *Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.*

Termination by Data Provider. *Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.*

For Breach. *Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has*

*breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.*

*Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.*

*Miscellaneous.*

*Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section 6.*

*Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.*

*No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.*

*Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.*

*Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.*

*IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.*

**Partner Site (Student's Employer)**

**Doctoral Student**

Signed: \_\_\_\_\_

Signed: \_\_\_\_\_

Print Name: \_\_\_\_\_

Print Name: \_\_\_\_\_

Print Title: \_\_\_\_\_

Print Title: \_\_\_\_\_