University of the Incarnate Word

The Athenaeum

12-2019

A Quality Improvement Initiative to Facilitate Provider Adherence to Type II Diabetes Mellitus Guidelines

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A QUALITY IMPROVEMENT INITIATIVE TO FACILITATE PROVIDER ADHERENCE

TO TYPE II DIABETES MELLITUS GUIDELINES

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Presented to the Faculty of the University of the Incarnate Word
in partial fulfillment of the requirements
for the degree of

DOCTOR OF NURSING PRACTICE

UNIVERSITY OF THE INCARNATE WORD

December 2019

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

Table of Contents—Continued

LIST OF TABLES

LIST OF FIGURES

Abstract

Background: A significant number of individuals with type 2 diabetes mellitus do not receive comprehensive diabetes care management to maintain optimal health.

Purpose: This project was designed to facilitate provider adherence to the type 2 diabetes mellitus evidence-based practice standards of care. A primary care practice needs assessment indicated opportunities to improve care management processes which promote adherence to current clinical practice guidelines.

Methods: This 10-week quality improvement project provided the clinical staff and provider with the necessary tools to implement best practices of diabetes care. Objectives assessed throughout project implementation included the design and use of an electronic health records alert system; clinical staff and provider participation in a diabetes education session; completion of the evidence-based comprehensive diabetes management flowsheet with verification by provider and patient signature; completion of routine laboratory tests such as HgbA1c and annual microalbuminuria; documentation of preventive measures employed such as medications, annual exams, and vaccines; and documentation of diet and exercise counseling.

Results: The use of a diabetes flow sheet resulted in decreased HgA1c results greater than 7.0% with more than half of the patients with type 2 diabetes mellitus having a prescribed preventive medication, and all patients with a completed flowsheet received diet and exercise education.

Implications for Practice: Incorporating current diabetes standards in the management of patients with type 2 diabetes can prevent disease-related complications and improve health outcomes.

Keywords: diabetes mellitus type 2, quality improvement, primary health care, evidence-based practice, patient care planning, diabetes complications, diet, diabetes, exercise, glycated hemoglobin A

Type 2 Diabetes Mellitus (T2DM) is a chronic condition in which the body is unable to make or use insulin properly (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2016). Diabetes can lead to debilitating complications if not appropriately managed or left untreated. Adherence to evidence-based diabetes care guidelines are essential to safeguard the health of each individual with diabetes. In addition to screening for diabetes and its complications, clinical practice guidelines recommend specific process measures to guide care and glycemic control targets (Casanova et al., 2016). Effective therapeutic management has been shown to prevent or delay diabetes-associated complications. However, studies have demonstrated a breakdown in meeting these goals by patients, healthcare providers, and systems (Casanova et al., 2016).

Problem

According to the Centers for Disease Control and Prevention (CDC), 30.3 million individuals within the United States have diabetes mellitus with more than 90% of them having T2DM (2018). It is estimated that by 2040, the global prevalence of diabetes will climb from 420 million to 642 million people (Reusch & Manson, 2017). This chronic condition predominately affects adults over the age of 45 but can also be seen in young adults and children (CDC, 2018). Individuals with diabetes spend twice as much on medical expenses when compared to individuals who do not have diabetes (American Diabetes Association [ADA], 2014). Some of the complications associated with diabetes include blindness, kidney failure, heart disease, stroke, and peripheral neuropathy (ADA, 2014). It is imperative that providers guide individuals with T2DM to follow preventive measures and promote continuous medical management of the disease.

Diabetic guidelines are continually being revised in order to reflect evidence-based practices for both clinical and preventive efforts. These standards are used to manage and continuously monitor the disease with routine laboratory work, lifestyle modifications, and referrals to specialists such as dieticians, ophthalmologists, and podiatrists (Hashmi & Khan, 2016). Use of these standards has been associated with positive changes in patients' hemoglobin A1c (HbA1c), lipid levels, and self-management (Hashmi & Khan, 2016). Adherence to diabetic guidelines has demonstrated the ability to reduce unnecessary healthcare costs (Hashmi & Khan, 2016). Moreover, health services at the systems level can impact the sustainability of these standards through financial resources, trained staff, policy, and an organizational framework (Hashmi & Khan, 2016).

Background and Significance

In 2015, the all-states median percentage of U.S. adults aged 18 and older with diabetes who did not receive two or more HbA1c tests in the last year was 28.6%; 28.4% did not receive an annual foot exam; 45.6% did not attend a diabetes self-management class; 38.4% did not have an annual dilated eye exam; and 37% report not completing daily self-monitoring of blood glucose (CDC, 2017). Processes that enable providers to consistently adhere to best practices in diabetes clinical care are crucial to improve patient outcomes and eliminate the complications so frequently associated with this disease. The current clinical practice guidelines for the management of diabetes support processes which facilitate adherence to evidence-based practices within a busy internal medicine practice (Handelsman et al., 2015; Riddle et al., 2018a). Such processes occur when best research evidence is used to identify strategies that will streamline care and improve patient outcomes. The 2018 ADA and 2015 American Association of Clinical Endocrinology and American College of Endocrinology (AACE/ACE) clinical

practice guidelines provide recommendations for the management of diabetes to improve health outcomes (Handelsman et al., 2015; Riddle et al., 2018a).

Assessment

A microsystem assessment was performed at a fast-paced internal medicine practice to evaluate T2DM management. The practice consists of two clinics located within rural communities in South Central Texas on the southside of San Antonio. The purpose of the internal medicine practice is to prevent, diagnose, and treat diseases affecting the adult population within these areas. The practice promotes the concept of a patient-centered medical home (PCMH) and education to establish lasting patient-provider relationships with their patients. PCMHs encompass comprehensive, patient-centered, coordinated care, accessible services, quality, and safety (Ackroyd & Wexler, 2014). Furthermore, PCMHs promote care of the whole patient boosting both patient and provider satisfaction (Ackroyd & Wexler, 2014).

The internal medicine practice managed the care of more than 4,260 patients at the two clinics in 2017. The majority of the practice's clients are White, Hispanic/Latino descent, male, and 60-69 years of age (Table 1). Clinic A is located in a community that has a total population of 26,119 residents (U.S. Census Bureau, 2016). This community's population is 77.9% White and 92.1% Hispanic/Latino descent (U.S. Census Bureau, 2016). The median household income within this zip code is $31,728 with 32% of the population living below the poverty level (U.S. Census Bureau, 2016). Clinic B is located in a rural community that has a total population of 6,012 residents of which 90% are White and 81% are of Hispanic/Latino descent (U.S. Census Bureau, 2016). The median household income within this zip code is $39,325 with 25% of the population living below the poverty level (U.S. Census Bureau, 2016).

Table 1

Total Practice Patient Population

Demographics	% (n)
Race	
Asian	0.4% (20)
White	59.2% (2,522)
Black	2.6% (111)
Other	37.7% (1,608)
Ethnicity	
Hispanic	79.8% (3,399)
NonHispanic	20.2% (862)
Age	
Less than 20	2.7% (113)
20 – 29	3.2% (138)
30 – 39	7.1% (304)
40 – 49	11.5% (492)
50 – 59	21.8% (930)
60 – 69	26.3% (1,122)
70 – 79	17.4% (743)
80 – 89	8.1% (349)
90 – 99	1.6% (70)
Sex	
Male	56.9% (2,423)
Female	43.1% (1,838)

The practice includes one physician with more than 30 years of medical practice experience, three full-time medical assistants (MAs), two receptionists, one information

technology administrator, one office manager, and one finance administrator. The physician

provides care to patients at both clinics. A second provider position is currently open. The most

common International Classification of Disease, Tenth Edition (ICD-10) codes billed by the

provider at these sites are illustrated in Table 2.

Table 2

Top 6 ICD-10 codes at Clinic A & Clinic B

ICD-10 codes	% (n) of Patients Diagnosed
Hyperlipidemia (E78.2)	16.8% (720)
Primary hypertension (I10)	16.0% (684)
T2DM with hyperglycemia (E11.65)	7.3% (313)
T2DM with neuropathy (E11.43)	4.5% (193)
Atherosclerotic heart disease (I25.118)	3.9% (168)
T2DM with Chronic Kidney Disease (E11.22)	3.7% (156)

Clinic Processes Prior to Intervention

The practice uses a collaborative approach in order to maintain efficient patient flow.

Clinic A examines 17 to 30 patients per day and Clinic B examines approximately 5 to 17

patients per day, respectively. The practice accepts most insurance plans and welcomes walk-ins.

Patient charts are prepared 2 to 3 days prior to the patient's scheduled appointment by MAs. For

most patients, the information technology administrator or MAs manually input one day prior to

patient appointments the guideline-recommended patient exams, vaccines, or medications for the

provider within the individual patient's electronic health record. At that time, the receptionist

calls the patients to confirm their appointment. The MAs review charts and input pertinent

information within an established patient intake sheet or establish a new patient intake sheet. The

prepared chart contains a pre-filled intake sheet, a billing form for the physician to complete, a copy of the patient's medications, and a copy of the patient's previously diagnosed ICD-10 codes. The MAs list the reason for the visit, past medical history, vital signs, vaccines needed, and previous diagnostic and laboratory exams completed. The provider adds information to the intake sheet regarding the physical exam, assessment plan, prescribed medications, in-clinic labs to be performed, preventive screenings to be ordered, and referrals. The provider also completes the billing form that includes current procedural terminology (CPT) codes, ICD-10 codes, office procedures, injections, vaccines, referrals, in-clinic laboratory orders, and out-of-clinic laboratory exam orders. The MAs then review the orders, administer ordered medications or vaccines, or draw laboratory tests. Once the patient is discharged, the provider gives the chart to the MAs. The MAs then transfer the billing form to the financial administrator and referral requests to the office manager. Lastly, the MAs send medication orders to the patient's pharmacy.

Practice Patterns

Aside from instituting a patient-centered medical home model approach, the internal medicine practice is also a member of an accountable care organization (ACO) which focuses on providing high quality care to their Medicare patients. The provider and practice manager/information technology administrator work to ensure that the practice remains in compliance with the most up-to-date clinical guidelines. The practice manager/information technology administrator reviews insurance panels weekly to evaluate practice metrics. Additionally, Clinigence software is used to assess daily practice compliance by collecting clinical data analytics. In evaluating diabetes metrics within Clinigence, it was noted that within the past year, 31.2% of patients with diabetes had elevated hemoglobin A1c (HbA1c) laboratory

results greater than 7%; with 43.8% of patients not having had a laboratory result within the past 6 months. The HbA1c provides information regarding the average amount of blood glucose in the blood within the past 3 months. The laboratory test is used to diagnose and manage T2DM (NIDDK, 2018). Normal HbA1c is below 5.7%, prediabetes is 5.7% to 6.4%, and diabetes is 6.5% or above (NIDDK, 2018). Therefore, an in-depth assessment of patients with diabetes was conducted to assess further change needs.

Purposive samples of diabetic patients were extracted from the electronic health records (EHR) of the two clinics in order to assess the patients' current self-management behaviors and barriers. Two specific sets of patients were selected; Group A consisted of the 125 patients having obtained HbA1c results in the last 6 months and a HbA1c greater than 7% within the prior 12 months and Group B consisted of the 176 patients who had not obtained a HbA1c laboratory result in the last 6 months. Electronic health records were reviewed to identify patient characteristics within Group A and Group B. Group A's sample was predominately male, English speaking, had a HbA1c greater than 9, and a BMI greater than 31 (Table 3).

Twelve patients were randomly selected constituting 10% of the Group A population for a telephone survey (Appendix A). Nine patients (75%) responded. Of the 9 patients who responded, 89% verbalized medication adherence, 33% verbalized following a diabetic diet, and 22% exercise most days of the week (Table 4).

Table 3

Purposive Sample Characteristics

Characteristics	Group A n = 12	Group B n = 17
Gender		
Male	8	11
Female	4	6
Primary Language		
English	11	14
Spanish	1	3
Insurance		
Medicare	3	1
Commercial	7	11
Cash	2	5
HbA1c		
None recorded	0	4
5.7% - 6.4%	0	2
7% - 7.9%	4	3
8% - 8.9%	1	3
9% +	7	5
BMI		
18.5 to 24.9	0	1
25 to 29.9	3	1
30 +	9	15
Number of Comorbidities		
1-2	1	4
3+	11	13

Table 4

Group A: Survey Results for Patients with Elevated HbA1c

Response	n (%) Yes	n (%) No
Patients who responded	9 (75%)	3 (25%)
Respondents who scheduled appointment	3 (33.3%)	6 (66.7%)
Respondents who adhere to medications	8 (88.9%)	1 (11.1%)
Respondents who adhere to diet	3 (33.3%)	6 (66.7%)
Nonadherent due to cost	0 (0%)	0 (0%)
Nonadherent due to inconvenience	1 (11.1%)	0 (0%)
Nonadherent due to refusal of diet plan	1 (11.1%)	0 (0%)
Nonadherent due to lack of information	1 (11.1%)	0 (0%)
Respondents who exercise	2 (22.2%)	7 (77.8%)

Seventeen patients were randomly selected from Group B, constituting 10% of this category, for a telephone survey (Appendix B). Thirteen patients (76%) responded. Of the 13 patients who answered, 31% were seeing another provider, 31% were not notified by staff of the need for a blood draw for a HbA1c level, and 23% did not provide a reason for failing to obtain a HbA1c (Table 5).

Barriers identified during the patient telephone survey were the inability to reach selected patients due to a non-working number and the failure of the patient to return the phone call. Assessment findings demonstrated an opportunity for improvement in comprehensive diabetes management. Comprehensive management of T2DM follows evidence-based approaches to care and acknowledges the patient as a whole including their risks and complications (Garber et al., 2018).

Table 5

Group B: Survey Results for Patients Without a Recent HbA1c Laboratory Result

Response	n (%) Yes	n (%) No
Patients who responded	13 (76%)	4 (24%)
Services obtained by respondents		
Endocrinologist	0 (0%)	0 (0%)
Seeing another provider	4 (30.8%)	8 (61.5%)
Not seeing an MD	1 (7.7%)	
Respondents notified by staff of need for HbA1c	9 (69.2%)	4 (30.8%)
Respondents provided reason HbA1c not obtained	10 (76.9%)	3 (23.1%)

Project Identification

Purpose and Objectives

The purpose of this quality improvement initiative was to implement an evidence-based approach to facilitate provider adherence to T2DM care management standards. The initiative is based on the 2018 ADA and 2015 AACE/ACE clinical practice guidelines which encompass screening recommendations, lifestyle therapy, pharmacotherapy, blood pressure management, and atherogenic cholesterol particle concentration management (Handelsman et al., 2015; Riddle et al., 2018a). The project leader and clinical mentor agreed upon the project objectives (Table 6).

Table 6

Project Objectives, Measurements, and Aims

Objectives	Measurement	Aims
1. Project leader and clinical mentor will design a comprehensive diabetes flowsheet.	Creation of a diabetes flowsheet prior to project implementation start date.	Diabetes flowsheets will be available at each nursing station in Clinic A and Clinic B.
2. Healthcare provider and MAs will be provided education on the current T2DM clinical practice guidelines.	Attendance at a 30-minute education session.	100% of the healthcare providers and MAs will attend the educational session.
3. MAs and provider will consistently use the diabetes flowsheet.	Confirmation of diabetes flowsheet completion by presence on chart with provider signature.	Diabetes flowsheet is completed for 70% of patients with T2DM.
4. Increase in provider adherence to the use of ADA and AACE/ACE diabetes standards.	Increase in documentation of coronary artery disease prevention treatment, vaccines, treatment adherence, and lifestyle management counseling on diabetes flowsheet and electronic health record.	70% of patients will have completed documentation.
5. The information technology administrator will implement an automated EHR alert system.	An automated EHR alert will notify the provider of recommended interventions/orders to be placed for all patients with T2DM, and the notification will be disabled once the intervention/order has been completed.	Alerts will be placed for all patients with T2DM in need of recommended orders/interventions.

Aims

The project leader and clinical mentor will collectively design a comprehensive diabetes

flowsheet in accordance with the 2018 ADA and 2015 AACE/ACE diabetes standards. The

flowsheet will be readily available at the start of project implementation at each nursing station

in both Clinic A and Clinic B. The staff within the internal medicine practice will participate in a

30-minute educational session reviewing the 2018 ADA and 2015 AACE/ACE diabetes standards, accompanied by information regarding project goals. The aim is to have 100% of the MAs and the provider attend this session. Additional staff, not required to participate in the documentation of the standards, will also be invited to participate including the practice manager/information technology administrator and receptionists. By participating in the session, they will learn the importance of implementing a diabetes flowsheet developed by the project leader in collaboration with the clinical mentor based on current evidence. The anticipated outcome is that 70% of patients with T2DM will have a completed diabetes flowsheet, which will be verified by provider and patient signature. This flowsheet will assist in increasing provider adherence to the implementation of the 2018 ADA and 2015 AACE/ACE diabetes standards. By doing so, the goal is to ensure 70% of patient charts will have documented counseling, treatment, and preventive measures. Additionally, the information technology administrator will ensure that an automated EHR alert will be placed for all patients with T2DM in need of recommended medical exams, laboratory testing, or medications.

Summary and Strength of the Evidence

In the U.S. 14% of adults have diabetes and only 19 to 34% of these individuals are successfully managed (Del Valle & McDonnell, 2018). Through a search of the literature for the years 2015 to 2018, no published studies were found that demonstrated an effective, comprehensive intervention used to facilitate provider adherence to the ADA or ACCE/ACE diabetes standards. However, many studies demonstrate clinical interventions designed to facilitate adherence to specific components of the guidelines. These components included diabetic retinopathy screening, foot exams, and nephropathy screening. Nonetheless, several studies have demonstrated the effectiveness of implementing a chronic care model approach in

the primary care setting in order to improve diabetes care management (ADA, 2016; Busetto, Luijkx, Elissen, & Vrijhoef, 2016; Clement, Harvey, Rabi, Roscoe, & Sherifali, 2013; Del Valle & McDonnell, 2018). Furthermore, the literature also demonstrated the need for a comprehensive approach in order to tackle the growing complexity of diabetes care management.

Chronic Care Model

Two recent systematic reviews demonstrate the need for a multifaceted approach to improving diabetes care management. Clement et al. (2013), demonstrated the need to strategize diabetes management through use of the Chronic Care Model (CCM). The CCM encompasses the six components of delivery system design, self-management support, decision support, clinical information, the community, and health systems (Clement et al., 2013). Canada's *2018 Clinical Practice Guidelines* state that implementing a greater number of CCM components within diabetes management leads to improved disease outcomes (Clement et al., 2013). The guidelines also share recommendations for each component that can be used within practice, as well as a sample diabetes patient care flowsheet within the appendix.

A review of the literature conducted by Busetto et al. (2016), defined integrated care as an intervention which emphasizes at least two components of the CCM. The review analyzed various CCM interventions used and their outcomes including an increase in glycemic control, blood pressure measurements, cholesterol measurements, health service utilization, foot examinations, and eye examinations (Busetto et al., 2016). Unfortunately, outcome measures and their association to intervention type could not be determined due to limited studies with similar outcome measures (Busetto et al., 2016). However, most studies included the decision support components such as provider education and systems training (Busetto et al., 2016). The provider education emphasized evidence-based practice and approaches to implementing guidelines.

Through use of CCM based interventions, 35 of the 44 articles analyzed indicated improved glycemic control, blood pressure, cholesterol measures, and body mass index (Busetto et al., 2016). Twenty studies also reported improved process measures such as glycemic control measurements, foot examinations, cholesterol laboratory results, and eye examinations (Busetto et al., 2016).

Innovative Approaches

A recent study by McLean et al. (2017), consisted of implementing an educational intervention in seven out of 49 clinic health system locations, in order to improve human papillomavirus (HPV) vaccination. The study entailed provider and staff education, quarterly vaccine coverage evaluations, and adjustments in system-wide patient reminders and recall reports (McLean et al., 2017). The educational session was 30 to 40 minutes long and included study presentation, department performance, and vaccine updates (McLean et al., 2017). In addition to verbal education, electronic and hard copies of provider resources and patient educational tools were provided during the meeting (McLean et al., 2017). The project staff visited the intervention sites three times during the beginning of the project to provide the educational meeting and to evaluate project findings (McLean et al., 2017). HPV vaccination was then assessed in quarterly intervals through patient electronic medical record reviews (McLean et al., 2017). Study results for the intervention group included an increase in HPV vaccination from 40.6% to 59.3%, compared to 31.9% to 44.5% in the control group (McLean et al., 2017). Provider and staff training contributed to the increase in vaccine coverage, however the use of patient reminders also influenced this change (McLean et al., 2017).

A retrospective study conducted by Umar-Kamara & Tufts (2013), illustrated the use of practice aids to improve provider adherence to diabetes care standards. Interventions included in

the study consisted of foot diagram labels to be placed on patient's flowsheet, templated eye exam referral letter, and a diabetes flowsheet to track laboratory results and recommended exams (Umar-Kamara & Tufts, 2013). In addition to labels used as a reminder for providers, a foot sign was placed on patient exam rooms to inform patients to remove their shoes in order to be prepared for the exam (Umar-Kamara & Tufts, 2013). Results included an increase in foot and microalbuminuria screenings, along with an increase in the number of individuals with a HbA1c < 9% (Umar-Kamara & Tufts, 2013). The study demonstrated that the use of diabetes flowsheets, clinical reminders, and referral forms can positively impact diabetes management.

A similar study conducted by Pastel, Liu, Homa, Bradley, and Batalden (2009), implemented a diabetes flowsheet during a 1-year time frame to improve diabetes process measures. The diabetes flowsheet contained information regarding dates of patients' previous routine care (Pastel et al., 2009). This alerted healthcare providers to the care needs of each patient such as recommended exams and assessment needs (Pastel et al., 2009). After the sheet was completed, it was then documented in the electronic medical record by the licensed nursing assistants (Pastel et al., 2009). The patients' plan of care and continuous treatment management was then discussed during staff meetings (Pastel et al., 2009). The study resulted in improved process and outcome measures with an increased percentage of vaccinations administered, foot examinations completed, and an increased number of patients with improved blood glucose and/or cholesterol control (Pastel et al., 2009).

A systematic review by Riddle et al. (2018b), demonstrates the significance of incorporating lifestyle management into diabetes care. It includes medical nutrition therapy, exercise, and self-management education and support (Riddle et al., 2018b). To optimize the well-being of patients with diabetes, it is essential to review these components during the initial

evaluation of the patient, during follow-up visits, and during assessments of health complications (Riddle et al., 2018b). Studies have demonstrated that diabetes self-management education can reduce healthcare costs and improve health outcomes (Riddle et al., 2018b). Consistent evidence also supports weight management as a preventive measure in delaying the progression of prediabetes and T2DM (Riddle et al., 2018b). By reducing caloric intake, studies have demonstrated reductions in HbA1c of 0.3% to 2.0% (Riddle et al., 2018b). Additionally, incorporating physical activity for at least 8 weeks has demonstrated a 0.66% reduction in HbA1c, with greater intensity exercises having superior reductions in HbA1c (Riddle et al., 2018b).

In a retrospective study conducted by Konerman et al. (2017), an EHR system prompt was implemented within 13 primary care clinics. This study sought to improve hepatitis C virus (HCV) screening and treatment. The EHR prompt served as a reminder to providers to perform HCV screening for patients who met screening criteria (Konerman et al., 2017). The prompt also included educational material, order set, and referral to specialty care for those newly diagnosed (Konerman et al., 2017). The study compared screenings among 52,660 patients, 3-years prior to EHR-based prompt implementation to post-implementation (Konerman et al., 2017). Three years prior to the implementation of the prompt, approximately 28% of the patients had been screened (Konerman et al., 2017). Whereas, 72% of patients were screened 1-year post-implementation of the prompt (Konerman et al., 2017). The process included the MA gathering patient information, discussing screening criteria, and asking the patient about prior screenings and results (Konerman et al., 2017). Next, the provider reviewed patient charts, completed the EHR-based prompt, discussed HCV screening with patient, and ordered the Hepatitis C Antibody Test

(Konerman et al., 2017). Lastly, the provider reviewed the result and acted according to the

result. This study demonstrated the positive impact of an EHR-based alert system.

Methods

From September 11, 2018 to October 1, 2018, a pre-intervention purposive sample was

extracted in order to conduct patient surveys among those with T2DM from September 1, 2017

to September 1, 2018. Two groups were surveyed with a total of 22 phone surveys conducted.

Data analysis demonstrated that of the patients with an elevated HbA1c, 11% did not adhere to

medication treatment, 67% did not follow a diabetes diet, and 78% did not perform the

recommended amount of daily physical activity. Additionally, of the patients without a recent

HbA1c laboratory result, 31% were not notified by medical staff of the need to have a test done.

Table 7

Project Objectives

Intervention	Current Adherence	Anticipated Adherence
Development of diabetes flowsheet	0%	100%
Staff education 2018 Diabetes Standards	0%	100%
Increased deployment of Alert System	50%	75%
Implementation of diabetes flowsheet	0%	70%
Implement weekly performance meetings	0%	70%

Four interventions were chosen to assist in the facilitation of provider adherence to

diabetes standards (Table 7). The first intervention was the creation of a comprehensive diabetes

flowsheet and its implementation process. The second intervention included education for the

staff and physician. The third intervention was to create EHR alerts with recommendations to

implement ADA guidelines by ordering needed annual exams, routine laboratory blood work,

referrals, or medications. The fourth intervention included the implementation of the diabetes

flowsheet which operated as a guide centered around the use of current diabetes guidelines.

Roles and responsibilities for each intervention were discussed and assigned (Table 8).

Table 8

Roles and Responsibilities

Intervention	Responsible Individual
Design diabetes flowsheet	Project leader Clinical mentor
Designate standardized alerts	Project leader Clinical mentor Practice Manager/IT Administrator
Develop and provide education for providers and staff	Project leader
Participate in diabetes guidelines and project education	Providers MAs Receptionist Practice Manager/IT Administrator
Activate alert system	MAs Practice Manager/IT Administrator
Complete diabetes flowsheet	MAs Providers Receptionist
Evaluate weekly performance reports	Project leader Clinical mentor IT Administrator

Education Session

Education was conducted at Clinic A on January 21, 2019 and at Clinic B on January 22,

2019. The education for the healthcare provider included a review of the ADA (2018) and the

AACE/ACE (2015) clinical practice guidelines (Handelsman et al., 2015; Riddle et al., 2018a).

A copy of the clinical practice guidelines was provided to the physician with the section entitled

Components of the comprehensive diabetes medical evaluation at initial and follow-up visits

highlighted (Riddle et al., 2018a). The clinic visit process changes for patients with diabetes were reviewed and discussed including staff responsibilities, the EHR alert system, and the healthcare provider responsibilities. The diabetes flowsheet outlining the in-clinic measures to be completed, documentation of counseling patients about preventive health and medications, along with referrals and follow-up care were discussed in detail (Appendix C).

Education of the MAs included the process changes for clinic visits of patients with diabetes. The MAs were instructed on patient measurements and sections of the diabetes flowsheet to be completed prior to clinician examination of the patient. Once the top section of the flowsheet was completed by the MA, the MAs would provide the patient with diet/exercise counseling sheets and instruct them to remove their shoes and socks in preparation for the provider's examination of their feet. Then prior to leaving the room, the MA would turn on a designated diabetes video via a handsfree tablet within the patient's examination room pertaining to the patient's learning needs such as diabetes management, diet, or exercise.

The receptionists were educated on the bottom section of the flowsheet. Once the flowsheet was signed by the provider and patient, the receptionist would then schedule the patient's follow-up appointment, inform the patient of referrals to be placed, and provide the patient with out-of-clinic laboratory orders and fasting instructions.

The financial administrator was informed about the implementation of the diabetes flowsheet. The administrator then educated the MAs on proper coding of diabetes flowsheet. Current procedural terminology (CPT) codes used for this process included care planning by the provider and CCM timed service.

Alert System

In order to facilitate adherence to the diabetes guidelines, an EHR alert system was designed to remind healthcare providers of required patient interventions for patients with the ICD-10 codes of T2DM with hyperglycemia (E11.65), T2DM with neuropathy (E11.43), and T2DM with chronic kidney disease (E11.22). The information technology administrator was asked to input needed measures within the patient's EHR 2 weeks prior to the patient's appointment. These patients included those with ICD-10 code E11.65. As the provider enters the patient's EHR an alert will appear with laboratory tests, annual exams, vaccines, or preventive medications due for request or renewal. This reminder assisted the provider to incorporate guideline-specific orders or preventive measures. The MA would then follow-up on the orders.

Diabetes Flowsheet

A diabetes management flowsheet with laboratory and preventive measures was created by the project leader and clinic mentor as a tool to facilitate the adherence to diabetes standards. The information within the diabetes flowsheet was based on the updated diabetes standards and the NIDDK (Garber et al., 2018; NIDDK, 2007; Riddle et al., 2018a). The flowsheet is formatted to follow the flow of routine visits and visit preparation making it easy for the MAs and provider to read and complete. The top section of the form consists of information that would be pre-filled by the MA including patient identifiers, vital signs, and results of laboratory tests and exams. The MA can highlight laboratory tests, vaccines, or medications needed as a method of reminding the provider to order, if indicated by guidelines of time, absence of results, etc. The MA places the diabetes management flowsheet at the front of the chart for the provider to see. The flowsheet included additional spaces for documentation on the sheet including assessments to be completed at each visit, preventive measures, counseling, referrals, and follow-up care. The

provider completes the therapeutic treatment plan and reviews the plan with the patient. The provider and patient then sign the sheet as an indication of its completion and agreement to recommendations. The MA then scans the flowsheet into the patient's EHR.

Organizational Barriers and/or Facilitators

An organizational barrier to the implementation of the diabetes management flowsheet was the daily volume of patients at the clinics, which resulted in a quick turnaround of patients. This resulted in limitations on the time for needed patient education and counseling. An additional barrier included the heavy workload and responsibilities of the MAs. Therefore, to avoid an increased workload, the MAs were not required to initiate an additional intake sheet if the patient was there for a follow-up visit.

Patient barriers included low socioeconomic status, language, and low health literacy. Often patients did not have current laboratory results, exams, or poorly controlled diabetes due to lack of funding. Additionally, more than half of the patients evaluated did not speak English. Patients who were non-English speakers with low health literacy demonstrated poor compliance with their diabetes treatment plan.

Facilitators included the physician's support of improvement initiative which helped gain support from the clinical staff. The practice manager/information technology administrator assisted in the implementation of automated EHR alerts and review of data analysis. Furthermore, use of the EHR to electronically collect data was an additional facilitator. The collaborative team effort and technological support increased adherence to the ADA (2018) and the AACE/ACE (2015) clinical practice guidelines.

Results

A chart audit checklist based on the diabetes care standards was created to assess the impact of project implementation. Chart audits were conducted once weekly during the 10-week duration of project implementation from February 4, 2019 to April 12, 2019. A total of 186 charts were reviewed throughout project implementation. The variables evaluated post-implementation included the design and implementation of the comprehensive diabetes flowsheet; design and implementation of automated EHR alerts; MA and provider participation in the diabetes education session; completion of diabetes management flowsheet verified by provider and patient signature; completion of routine laboratory tests such as HgbA1c and annual microalbuminuria; documentation of preventive measures such as medications, annual exams, and vaccines; and documentation of diet and exercise counseling.

Objective 1: The project leader and clinic mentor will design a diabetes flowsheet to use for every patient with T2DM. Results: A diabetes flowsheet was created to facilitate therapeutic treatment documentation of recommended measures for patients with T2DM. It included recommended laboratory measures, preventive medications, preventive annual exams, vaccines, and patient education. Patients excluded from this process included patients with T2DM that came to the clinic due to an acute illness.

Objective 2: The healthcare provider and MAs will participate in the diabetes educational session on the current T2DM clinical practice guidelines. Results: All of the MAs and the healthcare provider participated in a 30-minute education session, discussed the standards, and reviewed processes. The project leader conducted individual evaluations of the processes prior to project implementation.

Objective 3: MAs and providers will consistently use the diabetes flowsheet for 70% of patients with T2DM seen in the 10-week time period. Results: Diabetes flowsheets were completed for 81.7% of the 186 patients diagnosed with T2DM seen during the implementation period. Figure 1 demonstrates weekly provider performance of diabetes flowsheet completion following the MA initiating the form.
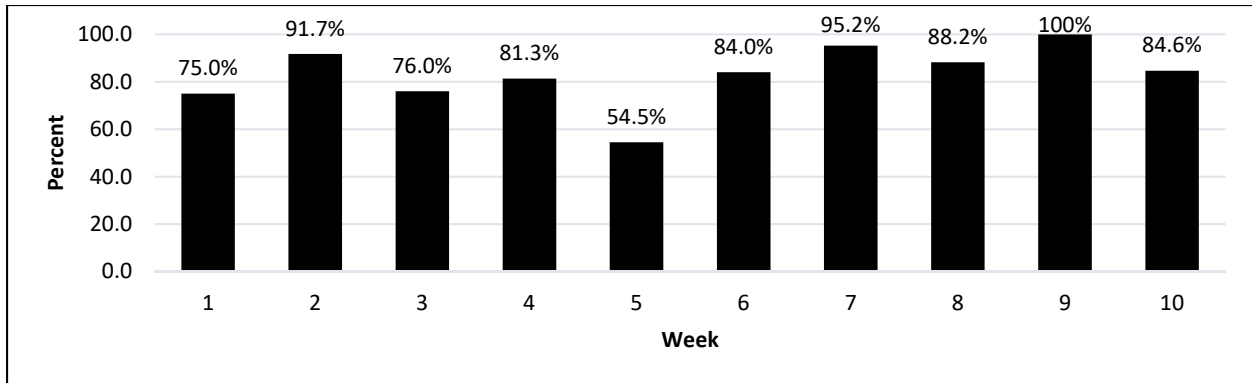

Figure 1. Diabetes flowsheets completed.

Objective 4: The provider will adhere to the 2018 ADA and 2015 AACE/ACE diabetes standards for 70% of patients as evidenced by documentation completion. Results: Of the 186 patients with T2DM that were seen, 97.8% of patients had documented diet and exercise counseling. In reviewing preventive medications prescribed to patients with a completed diabetes flowsheet, it was noted that 68.4% of patients were prescribed an ACE/ARB; 75.7% were prescribed a statin medication; and 56.6% of patients were prescribed aspirin (Figure 2). The percent of patients with a documented annual microalbuminuria, annual diabetes eye exam, current influenza vaccine, and current pneumococcal vaccine was also demonstrated (Figure 3). Lastly, approximately 32.7% of patients had a documented foot exam.
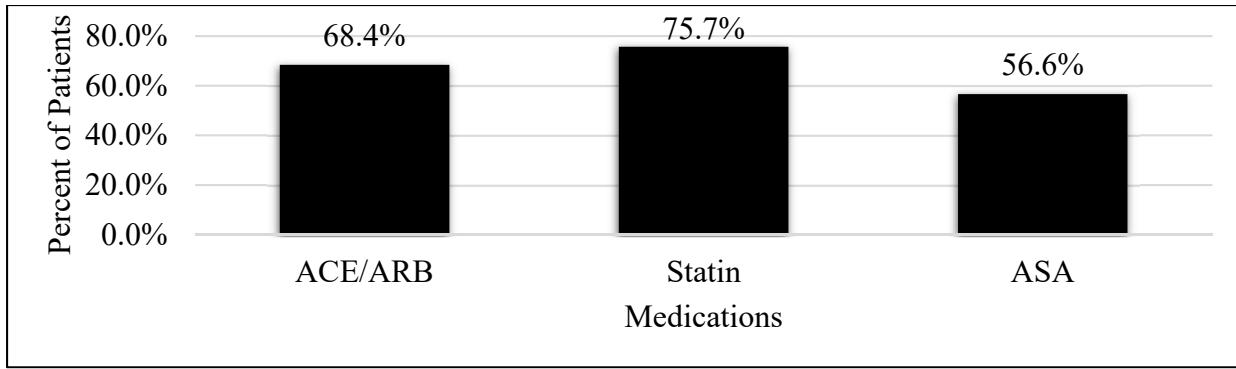
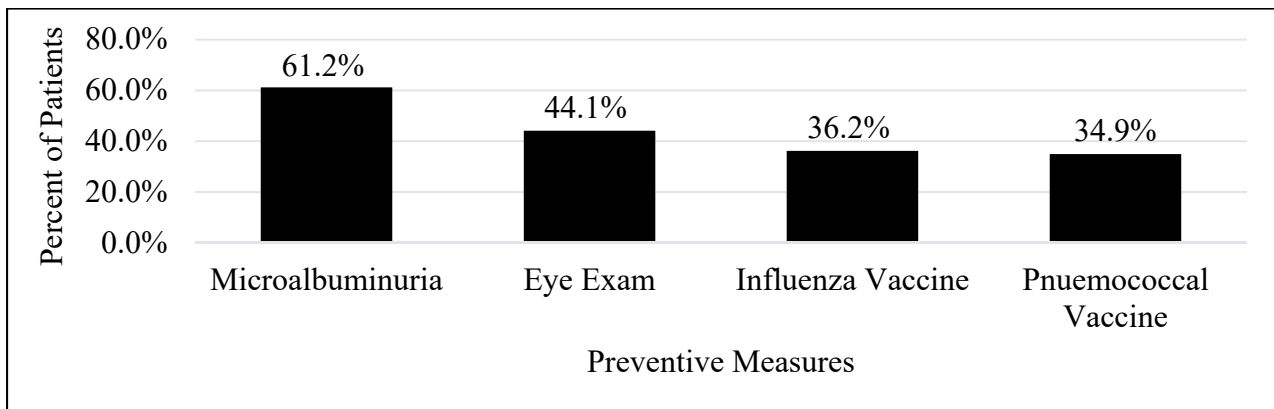*Figure 2.* Percentage of patients on preventive medications.

Figure 3. Percentage of patients with documented preventive measures.

The HbA1c laboratory results among patients with T2DM were compared pre-implementation and post-implementation of the quality improvement project to enhance provider adherence to evidence-based practices. It was noted that there was a decrease in the percent of patients with HgA1c results greater than 7.0% post-implementation (Figure 4).

Throughout the implementation process the clinic had the ability to bill patients for chronic care management services, CPT code 99487, and individualized care planning, CPT code G0506. Chronic care management billing, CPT code 99487, assumed 60 minutes of clinical staff time for the ongoing management and decision-making related to moderate-high complex patients (Department of Health and Human Services, 2016). If the provider spent more time with the patient's diabetes management, code 99489 would be used for an additional 30 minutes, or

99490 would be used for an additional 20 minutes. Clinic reimburesements were dependant upon the individuals insurance plan. Approximately 61.8% of patients were billed for chronic care management services and/or individualized care planning during the 10-week implementation process. Weekly percent of patients billed for chronic care management demonstrates fluctuation throughout the project with a general overall increase of CCM services billed (Figure 5).
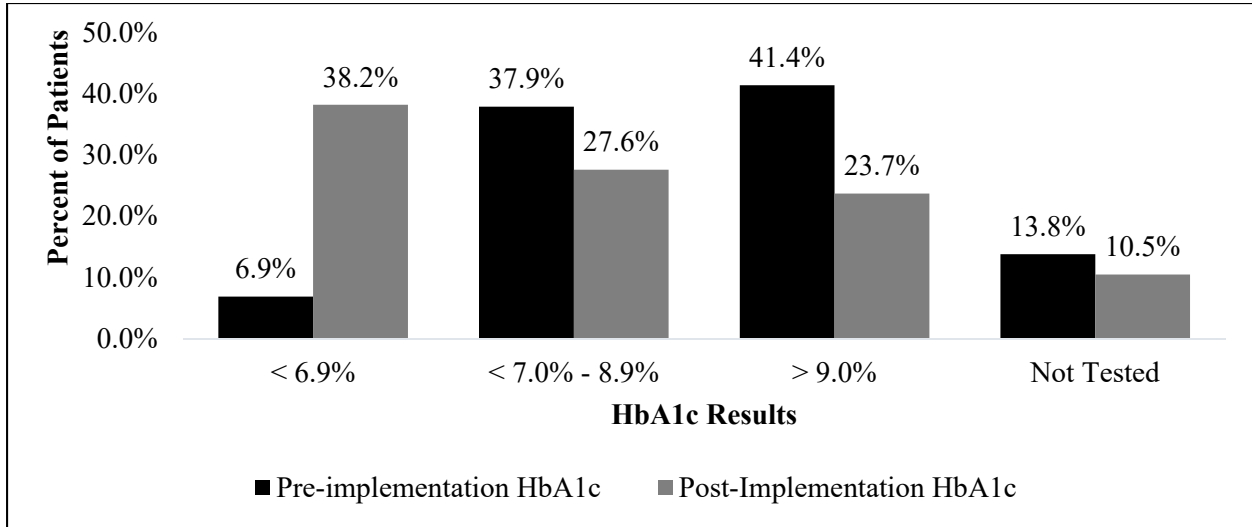

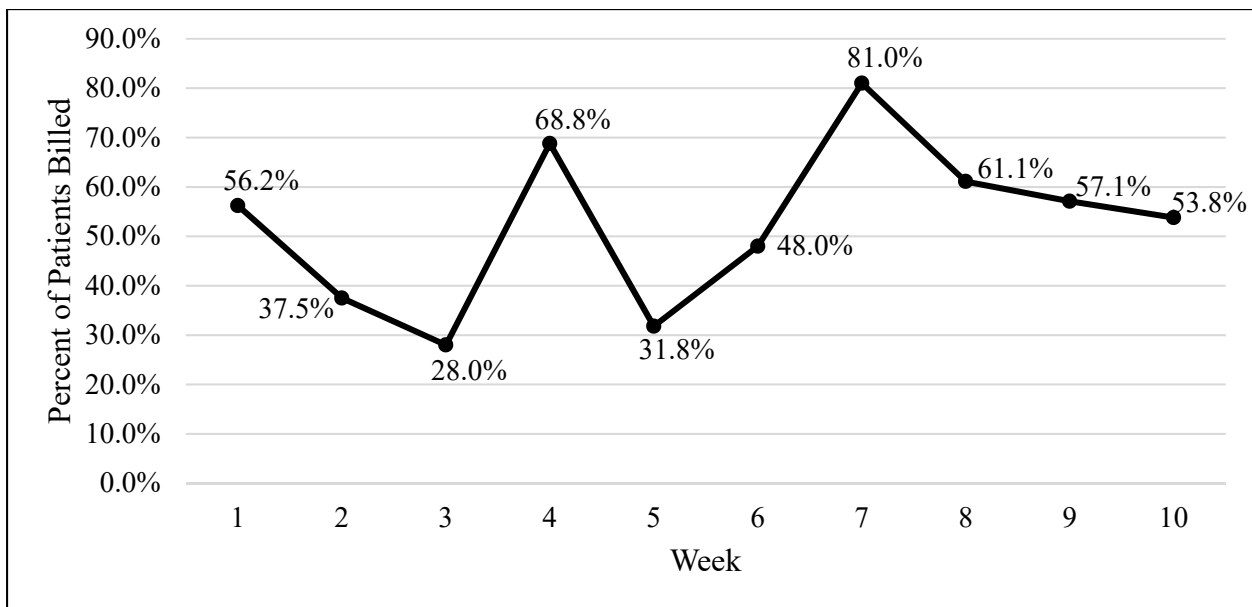*Figure 4.* HbA1c pre- vs. post-implementation.

Figure 5. Percentage of patients billed per week

Objective 5: The information technology administrator will implement an automated EHR alert system for all patients with T2DM. Results: This objective was met. Previously, the information technology administrator or MAs would input alerts manually in to the EHR. Currently, all patient EHRs with T2DM have an automated alert system to notify the provider of recommended measures that the patient may be missing according to diabetes standards.

Discussion

Provider and staff participation resulted in an understanding of the importance of adherence to the 2018 ADA and 2015 AACE/ACE clinical practice guidelines which encompass screening recommendations, lifestyle therapy, pharmacotherapy, blood pressure management, and atherogenic cholesterol particle concentration management (Handelsman et al., 2015; Riddle et al., 2018a). Through the implementation of education and process improvement, both provider and staff created positive changes in the management of patients with T2DM as also seen in the study by Pastel et al. (2009). Studies, including Pastel et al. (2009), recommended the use of the CCM to assist providers to focus on self-management support, clinical information, delivery system design, decision support, health systems, and community resources. The CCM model was the basis of this project's integration of diabetes standards of care into a comprehensive diabetes flowsheet along with the incorporation of an active EHR alert system.

Overall, adherence to the current diabetes standards remained steady over the implementation time period. Weekly progress reviews enabled the provider, MAs, and practice manager to determine areas requiring additional process improvement. As asserted by Pastel et al. (2009) self-awareness and process change enables the provider and staff to positively improve care. Of the 152 patients that had a completed diabetes flowsheet, 10.5% did not have a documented HbA1c. This result is approximately 18.1% lower than the all-states median

percentage of 28.6% U.S. adults that did not receive two or more HbA1c tests in the last year

(CDC, 2017). Due to the high volume of patients seen, foot assessments were often missed. This

resulted in 67.3% of patients not receiving a foot exam. This result is 38.9% greater than the all-

states median percentage of 28.4% in U.S. adults (CDC, 2017).

Incorporation of a therapeutic treatment plan into the flowsheet provided the patient

written clarification of preventive measures. All patients with a completed diabetes flowsheet

received diet and exercise counseling aligned with their personal needs. In accordance with

Riddle et al. (2018b) individuals in need of weight loss were encouraged to reduce their caloric

intake to 1,200 to1,500 kcal/day for women and 1,500 to1,800 kcal/day for men depending on

their baseline weight. The provider was prompted by the flowsheet to provide each patient with a

diet recommendation and a one-week sample meal plan in accordance with their caloric needs.

The provider was also prompted to recommend exercise time and examples of physical activity

that could be completed in a safe manner.

Sustainability of the diabetes flowsheet is fortified by the increased revenue through the

use of chronic disease management codes. The practice had the opportunity to receive

reimbursement for approximately 94 patients during the 10-week implementation process.

Limitations

There were limitations noted throughout the implementation of the project. First, the

practice, which consists of two busy clinics, only had one provider and is currently seeking an

additional provider. Consistently high volumes of patients resulted in heavy workload and

responsibilities among the MAs. The heavy workload of the clinical staff could have precipitated

18.3% of the 186 patients not having a diabetes flowsheet completed or resulted in the failure to

instruct patients to remove their shoes as a reminder for the provider to complete a foot

assessment. Additionally, the practice predominately saw patients of Hispanic descent with both language and economic barriers. The low health literacy and financial burden among patients may have been the result of their inability to obtain needed laboratory testing and annual exams.

This quality improvement initiative demonstrated that a multifaceted approach can improve therapeutic management for individuals with T2DM. However, with only 32.7% of patients having their feet assessed during implementation period, it is recommended that further education be provided to clinical staff about the importance of foot exams. Providing the clinical staff with visual cues as a reminder of ensuring that preventive measures for each patient are assessed could result in a greater number of patients having their feet assessed (Clement et al., 2018; Umar-Kamara & Tufts, 2013). The practice could use labels on the flowsheet as a reminder for providers and a foot sign placed on patient exam rooms to inform patients to remove their shoes (Umar-Kamara & Tufts, 2013).

Recommendations

Ongoing performance improvement review of the measures related to comprehensive diabetic care is needed to ensure advancement in the management of patients with T2DM. Weekly process reviews by administrative staff and the practice provider will aid in updating measures within the diabetes flowsheet. Through process reviews, the practice will also identify barriers to care and facilitators that will further enhance the management of patients with T2DM. Therefore, review meetings will also guide the provider in delivering appropriate individualized treatment plans.

These reviews should be accompanied by continuing staff education on the implications of T2DM standards of care to ensure sustainability of the diabetes flowsheet. The

implementation of the diabetes flowsheet should also become a component of new staff

orientation.

Providing consistent patient education can also ensure greater self-management support

and increase health awareness. This can be done through review of previous flowsheets within

the patient's EHR to identify areas in need of reinforced patient knowledge. Such areas include

diet, exercise, importance of obtaining necessary laboratory tests and exams.

Implications for Practice

Incorporating current diabetes standards in the management of patients with T2DM can

significantly prevent complications and improve health outcomes. The doctorally-prepared nurse

practitioner can effectively assess care processes to improve patient care within a clinical setting.

The use of a diabetes flowsheet can positively increase provider adherence to T2DM standards of

care.

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Appendix A: Survey Questions for Patients with Elevated HgbA1c Results

Patient's Name: **No answer: 1   2   3   LM   Returned call**

Survey Questions for patients with elevated HgbA1c results:

Hello, my name is _____. I am a nurse working with Dr. Rocha,

calling his patients to see how they are doing. We noticed that your last visit with him was ____

and you are scheduled to see him again on _____. Will you still be able to come to this

appointment?

Next Appointment: ☐ Scheduled   Date: _____
                        ☐ Not Scheduled: Reason: _____

Let's review your diabetes medications. Are you taking the diabetic medications at the times the

doctor prescribed?

Medication	Dosage	Frequency

Have you made any changes in your Diabetes medications? If so, is there a reason why you are

not taking them as prescribed? If no changes: It's great to hear that you are taking the medication

as prescribed.

Changes to medications: ☐ No   ☐ Yes
        If yes: ☐ Cost   ☐ No insurance coverage   ☐ Forgot
                      ☐ Lack of support   ☐ Lack of organization   ☐ Knowledge deficit
                      ☐ Blood sugar high   ☐ Blood sugar low

Are you following the instructions for a diabetic diet?   ☐ Yes   ☐ No

Diet: ☐ Cost   ☐ Inconvenient   ☐ Refuses to follow diet

             ☐ Lack of information   ☐ Diet Consult needed   ☐ Information needed

How many days a week do you exercise for 30 min?

Exercising: ☐ 0   ☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5+

Appendix B: Survey Questions for No HbA1C Within the Past 6 Months

Patient's Name: **No answer: 1   2   3   LM   Returned call**

Survey Questions for no HbA1C within the past 6 months:

Hello, my name is_____. I am a nurse working with Dr. Rocha, calling his

patients with diabetes. We noticed that your last visit with us was_____. Are you

receiving your medical care at a different facility?

Services: ☐ Endocrinologist   ☐ Seeing another PCP   ☐ Not currently seeing an MD

If not: We see that your last hemoglobin A1c was _____, and that was done _____

_____. This is a lab result that needs to be done every 3 months in order to help you control

your diabetes. Did the staff ask you during your last visit to take a blood test for your Diabetes?

HbA1c: ☐ Asked by staff   ☐ Not asked by staff

If so: Is there a reason why you were unable to have it done?

Reason lab not complete: ☐ Cost   ☐ No insurance coverage   ☐ Refusal
                               ☐ Transportation   ☐ Inconvenient   ☐ Forgot
                               ☐ Lab site not provided

If not: When would you be able to have your blood test done so we can schedule you for a

follow-up visit to help you with your Diabetes?

Next Appointment: ☐ Scheduled   Date: _____
                        ☐ Not Scheduled: Reason: _____

Appendix C: Diabetes Flowsheet

Diabetes Flowsheet

Patient Name: _____ DOB:_____ ID/MRN:_____

Weight:_____ BMI:_____ Blood Pressure:_____ Random Glucose:_____ Fasting Glucose:_____

Every Visit:
Last HbA1c Date:_____ Result:_____

Next HbA1c ordered: [ ]Yes [ ]In clinic lab [ ]Out of clinic lab

    Lab not complete: [ ]Cost [ ]No insurance coverage [ ]Refusal [ ]Transportation
          [ ]Inconvenient [ ]Forgot

    Glucometer: [ ]Yes [ ]No   Strips: [ ]Yes [ ]No   Lancets: [ ]Yes [ ]No

    Glucose monitoring: [ ] Daily [ ] Twice a day [ ] Other _____

Labs:
Hemoglobin A1c:
    [ ] Every 3 - 4 months [ ] Every 6 months

Annual:
    [ ] Lipid profile
    [ ] Liver function test
    [ ] Spot urinary albumin – to – creatinine ratio
    [ ] Serum creatinine and estimated glomerular filtration rate

Preventative Measures:

Medications:	**Annual Exams:**	**Vaccines:**	
[ ] ACE/ARB _____	[ ] Microalbuminuria	[ ] Influenza (Annual)	[ ] Hepatitis B (3-dose series)
[ ] Statin _____	[ ] Dilated Eye Exam	[ ] Pneumococcal (PCV13)	[ ] Pneumococcal (PPSV23)
[ ] Aspirin _____mg	[ ] Foot Exam	[ ] Vaccinations Up-to-date	

Medical screening:
Visual Inspection of Feet: [ ] Normal   [ ] Abnormal _____

Visual Inspection of Skin: [ ] Abscess   [ ] Acanthosis   [ ] Ulcers   [ ] Insulin injection site   [ ] Other_____

Screen for PAD: Pedal pulses: [ ]Present   [ ] Diminished

Therapeutic Treatment Plan:

Weight:_____ Goal:_____ BMI:_____ Goal: _____   [ ]Meal Nutrition Therapy Referral   [ ] Dietary counseling

Diet Recommendation:
[ ] 1,200 to 1,600 calories per day
- Small woman who exercises
- Small or medium-sized woman wanting to lose weight
- Medium sized woman that does not exercise much

[ ] 1,600 to 2,000 calories per day
- Large woman who wants to lose weight
- Small man at a healthy weight
- Medium-sized man who does not exercise much
- Medium-sized or large man who wants to lose weight

[ ] 2,000 to 2,400 calories per day
- Medium-sized or large man who exercises a lot or has a physically active job
- Large man at a healthy weight
- Medium-sized or large woman who exercises a lot or has a physically active job

Exercise:
5 days per week:
   Age 18+:   [ ] 30 min of moderate aerobic exercise per day
          [ ] 15 min of vigorous aerobic exercise per day

3+ days per week:
   Age 65+ at risk for falls: [ ] physical activity to enhance balance and prevent falls

Discuss High Risk Behaviors: [ ] Tobacco cessation   [ ] Alcohol counseling

Review current medications (administration, dosage, adherence): [ ] Yes [ ] No
    Medication Changes: [ ] Insulin   [ ] Oral hypoglycemic   [ ] ACE/ARB   [ ] Statin   [ ] ASA

_____   _____   _____

_____   _____   _____

_____   _____   _____

Management:

    Referral to: [ ] Endocrinologist   [ ] Ophthalmologist / Optometrist   [ ] Podiatrist   [ ] Dietician   [ ] Other: _____

    Equipment: [ ] Continuous Glucose Monitor (iPro) Duration:_____   [ ] Other _____

Follow-up: [ ] _____ weeks [ ] _____ month(s) [ ] Nurse Visit   Lab Follow-up: [ ] _____ weeks [ ] _____ month(s)

Clinician's signature:_____   Date: _____   CCM Minutes:_____

Patient Signature:_____   Date:_____