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Assessing Patients' Perception of Diabetic Educational Methods in an Urban Primary Care Clinic

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DNP Final Project Report

Assessing Patients' Perception of Diabetic Educational Methods in an Urban Primary Care Clinic

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College of Nursing

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Dedication

I would like to dedicate this project to my fiancé, my parents, brothers, sister-in-laws, and my best friends. Thank you for living through these past three years with me, always providing words of encouragement and the support I needed to finish this degree.   To my fiancé, Colton, I would not have made it without your constant love and support. This is for my parents, who are even more proud of me than I am of myself.

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Abstract

BACKGROUND: From 1980 through 2014, the number of adults with diabetes in the United States has nearly quadrupled, from 5.5 million to 29.1 million. When diabetes education is combined with appropriate medical management, this result in improved participation in diabetes self-management, improved glycemic control, and improved medication adherence. Health education materials, including diabetic education material, are often written at a higher reading level than patients with lower health literacy can understand.

PURPOSE: The purpose of this study was to evaluate the educational information, both verbal instructions as well as written material, provided to patients with type 2 diabetes mellitus This project assessed patient perception, satisfaction, and understanding of the diabetic education given to them in an urban primary care clinic. This project also assessed provider perception of and current methods of providing diabetic education.

METHODS: This study was a single-center, cross-sectional study consisting of face-to-face patient and provider interviews at an urban primary care practice. The sample consisted of 24 total subjects, 20 patients and 4 providers at the clinic.

RESULTS: Sixty five percent of the study participants had HbA1c levels above 7.0%. Patients reported receiving adequate education, with verbal education as the primary method. A majority (60%) of participants have received written handouts in the past, and 87.5% of those who have never received handouts were interested in receiving them in the future. Of those who have received educational handouts, 91.7% reported reading the material at home, 90.9% reported the materials were easy to read and understand. Contrastingly, 50% of the providers felt the handouts are not helpful or utilized by patients. Only 30% of patients had met with the diabetic educator. All of the patients want continued verbal education, 90% want written education/handouts (with 75% requesting handouts with pictures/diagrams), and 70% of patients stated they are interested in meeting with the diabetic educator in the future.

CONCLUSION: Continuing to provide verbal education, in conjunction with other resources may be more effective in helping patients reach glycemic goals. Providers need to increase the utilization of the clinic's existing resources, particularly written materials and referrals to the diabetic educator. Providing patients with handouts at every visit in addition to yearly meeting with the diabetic educator may increase patient involvement in their diabetic care, thus decreasing HgA1c levels.

Assessing Diabetic Patients' Perception of Diabetic Education Methods in an Urban Primary Care Clinic

Introduction

Chronic diseases are the main cause of death in the United States today, with diabetes as the 7th leading cause of death in 2013 (Centers for Disease Control and Prevention [CDC], 2016). Approximately 1.4 million Americans are diagnosed with diabetes every year (American Diabetes Association [ADA], 2017). According to the 2017 ADA Standards of Medical Care in Diabetes, diabetes self-management education is a fundamental aspect of diabetes care. Diabetes self-management education and support can improve patient outcomes and reduce costs. When appropriate medical management is combined with self-management education, glycemic control can improve significantly (CDC, 2016).

Background

Diabetes

From 1980 through 2014, the number of adults with diabetes in the United States (U.S.) has nearly quadrupled, from 5.5 million to 29.1 million (Figure 1) (CDC, 2015). In addition to the 29.1 million people living with diabetes, 86 million are living with pre-diabetes (CDC, 2016). Diabetes mellitus is characterized by high blood glucose levels (hyperglycemia) caused by the body's inability to correctly provide or utilize insulin (ADA, 2017). Type 2 diabetes, the most common form, is when the body does not produce enough insulin or does not provide enough insulin to maintain a normal glucose level (ADA, 2017).

Diagnosis. Diabetes and pre-diabetes can be diagnosed by three blood tests. Hemoglobin A1c (HbA1c) is a measure of the average blood glucose level over the past 3 months (ADA, 2017). Normal HbA1c is less than 5.7% (ADA, 2017). Diabetes is diagnosed when HbA1c is greater than or equal to 6.5% and pre-diabetes is a HbA1c between 5.7% - 6.4% (ADA, 2017). Diabetes and pre-diabetes can also be diagnosed by a fasting plasma glucose level (FPG), and an oral glucose tolerance test (OGTT) (ADA, 2017). Test results indicating diabetes and pre-diabetes are as follows:

- Diabetes
  - HbA1c: *6.5% or higher*
  - FPG: *126 mg/dl or higher*
  - OGTT: *200 mg/dl or higher*

- o   Random Plasma Glucose Test: *200 mg/dl or greater*
- Pre-diabetes
  - o   HbA1c: *5.7% – 6.4%*
  - o   FPG: *100 mg/dl – 125 mg/dl*
  - o   OGTT: *140 mg/dl – 199 mg/dl*

(ADA, 2017)

Epidemiology and significance. Diabetes is recognized as a leading cause of death and disability in the U.S., is highly underreported as a cause of death (ADA, 2017), and is a significant national and local problem. The Kentucky rate of diabetes increased 5% from 6.3% to 11.3% from the year 2000 to 2014 (CDC, 2015). The prevalence of diabetes in Kentucky was 11.3% in 2014, compared to the national rate of diabetes 6.2% (CDC, 2015). Therefore, Kentucky's rate was almost double the 2014 national average of adults with diabetes (Figure 2). Not only is the prevalence of diabetes high in Kentucky, the mortality rate is high as well. Kentucky has the 14th highest diabetes mortality rate in the nation (CDC, 2014). Diabetes is the leading cause of kidney failure, lower-limb amputations, and adult-onset blindness (CDC, 2016). According to the CDC's Report Card on Diabetes (2015), one out of every three adults in the United States could have diabetes by the year 2050 if this trend continues.

Financial implications. Diabetes is not only affecting the health of the population, it is also responsible for a significant financial burden to the nation, states, and local communities. More than 20% of health care spending is on diabetes (CDC, 2016). In 2012, the national cost of diabetes in the United States was an estimated $245 billion dollars (CDC, 2015). Of this, $176 billion was spent in direct medical costs and $69 billion was spent on indirect costs from lost workdays, restricted activity, disability, and death related to diabetes (Figure 3, CDC, 2015). Kentucky's high diabetes prevalence and mortality rates come at a significant cost. The ADA (2017) estimates that the cost of diabetes to Kentucky will be $3.85 billion, with $2.66 billion dollars in direct medical costs and an additional $1.9 billion in indirect costs. This is the highest per patient cost and total cost for any chronic disease in the Kentucky Medicaid population (Kentucky Department for Public Health, 2015).

Consequences of Diabetes

Cardiovascular disease and stroke. Diabetes increases the risk of various cardiovascular problems, including coronary artery disease, heart attack, stroke, and narrowing

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of arteries (atherosclerosis). From 2003 to 2006, cardiovascular disease death rates were an estimated 1.7 times higher among adults diagnosed with diabetes compared to adults without diabetes (CDC, 2014). In 2010, hospitalization rates for acute myocardial infarction were 1.8 times higher and stroke hospitalization rates were 1.5 times higher among adults with diabetes (aged 20 and older), compared to those without diabetes (CDC, 2014).

Hypertension. High blood pressure (hypertension) causes the heart to work harder and increases the risk of heart disease, stroke, and many other health problems (ADA, 2017). Nearly 1 in 3 American adults have hypertension and 2 in 3 people with diabetes have hypertension (ADA, 2017). From 2009 to 2012, 71% of adults aged 18 years or older with diabetes had a blood pressure, equal to 140/90 or greater, or were being treated for hypertension with prescription medication (CDC, 2014).

Hyperlipidemia. Elevated cholesterol levels (hyperlipidemia) refers to increased fat in the blood, including cholesterol and triglycerides (ADA, 2017). Low-density lipoprotein (LDL) cholesterol is considered the "bad" cholesterol because it contributes to plaque, a thick, hard deposit that can clog arteries and make them less flexible (ADA, 2014). If a clot (atherosclerosis) forms, heart attack and stroke can result (ADA, 2014). From 2009 to 2012, 65% of adults 18 years and older with diabetes had blood LDL cholesterol greater than or equal to 100mg/dl or used cholesterol-lowering medications (CDC, 2014).

Neuropathy and amputations. Nerve damage (neuropathy) is caused by excess of sugar in the walls of tiny blood vessels (capillaries) that supply blood to nerves. This damage can cause tingling, numbness, and pain (ADA, 2017). Nerve damage and poor blood flow to the feet increases the risk of various foot complications. Diabetic foot ulcers and cuts can results in poor healing and serious infection that may require toe, foot, or leg amputations (ADA, 2017). In 2011, an estimated 60% of non-traumatic lower-limp amputations were performed among adults with diabetes (CDC, 2014).

Diabetic retinopathy. Diabetes can damage the blood vessels of the eye (diabetic retinopathy), which can result in blindness (ADA, 2017). In 2005 – 2008, 4.2 million of adults aged 40 years or older with diabetes had diabetic retinopathy (CDC, 2014). In addition, people with diabetes are 40% more likely to suffer from glaucoma and 60% more likely to develop cataracts than people without diabetes (ADA, 2017).

Kidney disease. The kidneys contain millions of tiny blood vessel clusters that filter

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waste from the blood. Overtime, diabetes can significantly damage this delicate system (ADA, 2017). Severe kidney damage can lead to kidney failure or irreversible end-stage kidney disease (ADA, 2017). Diabetes was the primary cause of kidney failure in 44% of all new cases in 2011 (CDC, 2014). In the same year, 228,924 people with kidney failure due to diabetes were living on chronic dialysis or with a kidney transplant (CDC, 2014) (Figure 4).

Educational Interventions

Education plays a central role in the prevention and treatment of diabetes. The American Diabetes Association publishes updated guidelines and recommendations every year and According to the 2017 guidelines, diabetes self-management education, or DSME, is a fundamental aspect of diabetes care & can drastically improve patient outcomes and reduce costs (Figure 5). DSME is the ongoing process of facilitation the knowledge, skill, and ability necessary for diabetes self-care (ADA, 2017). One recommendation of the ADA Standards of Care for Diabetes Management (2017) is eliminating disparities through "individualized, patient-centered, and culturally appropriate strategies as well as system-level interventions" (p. S8). Another recommendation of the ADA (2017) is "a patient centered communication style that uses active listening, elicits patient preferences and beliefs, and assesses literacy, numeracy, and potential barriers to care should be used to optimize patient health outcomes and health-related quality of life" (p. S25).

Effective communication between the provider and the patient is a key factor in the delivery of high quality patient care (Berkman et al., 2011; Engel et al., 2012). When diabetes education is combined with appropriate medical management, the result is improved participation in diabetes self-management, improved glycemic control, and improved medication adherence (Choi, 2016; Koh et al., 2012; Wolff et al., 2009). The 2004 Institute of Medicine (IOM) report on health literacy called for attention to the intersection between people's skills and health systems' demand and expectations. Following this report, there has been increased attention and research on effective patient-provider communication. This shift in research produced significant evidence on the relationship between the characteristics of the patient-provider exchange and health outcomes, health inequalities, chronic disease management, and quality of care.

The most common form of educational exchange between primary care providers and patients is through face-to-face verbal education although most patients prefer to receive

education through multiple modalities (McKenna et al., 2003; Berkman et al., 2011; Engel et al., 2012). Providing patients education through multiple forms, such as verbal, written, and group settings has proven to have a positive impact in achieving glycemic goals (Wolff et al, 2009; Hill-Briggs & Smith, 2008). However, health education, including both verbal and diabetic educational material, are often presented or written at a higher reading level that patients with lower health literacy can understand (Wolff et al, 2009; Hill-Briggs & Smith, 2008; Choi, 2016; Koh et al., 2012; Nouri & Rudd, 2014). Self-management practices and skills vary according to the patient's level of health literacy (Nielsen-Bohlman, Panzer, & Kindig 2004; Berkman et al., 2011; Engel et al., 2012; Lindquist et al., 2012). If patients cannot understand the education provided, both verbal and written, they are not equipped with the knowledge and skills needed to successfully manage their health condition.

Health Literacy

The World Health Organization (WHO) defines health literacy as "the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health" (2015, p. 1). The term 'health literacy' encompasses not only literacy and numeracy skills, but also includes factors that can influence health decisions and behaviors (Nutbeam, 2008; Baker, 2006; Ishikawa, Takeuchi, & Yano, 2008). These factors include one's ability to find, understand, evaluate, and make decisions (Nutbeam, 2008; Baker, 2006; Ishikawa, Takeuchi, & Yano, 2008). Limited health literacy is when people's literacy and numeracy skills are poorly matched with the health information given to them, in verbal, written, or other forms (CDC, 2016).

Communication of everyday information occurs on multiple levels, including: interpersonal, group, organizational, & technological, through two primary formats: oral and written information (WHO, 2015; CDC, 2016). Professional organizations such as the U.S. Health and Human Services (HHS) and WHO recommend all educational material is written at or below a third-grade reading level (HHS, 2010; WHO, 2015). Educational material containing simplified text as well as pictures improves patient understanding of educational handouts, especially in patients with low literacy skills (Choi, 2011; Houts et al., 2006; Wolpin et al., 2016). Furthermore, pictures and illustrations in educational material have been found to improve readability and comprehension of health information (Lindquist et al., 2012; Choi, 2011; Houst, 2006; Mohan, Riley, Boyington, & Kripalani, 2003; Wolpin et al., 2016).

Consequences of low health literacy. Health literacy plays a significant role in a patients' ability to understand an educational intervention. An estimated ninety million Americans have limited health literacy (IOM, 2004). The people who are most likely to have low health literacy are those that read at and below at 6th grade reading level, however, people with a reading level of 7th – 8th grade still struggle with most patient education materials and will not be offended by low-literacy materials (Arozullah et al., 2007). Low health literacy is associated with decreased patient understanding of educational interventions, both verbal and written (Berkman et al., 2011; Engel et al., 2012).

When patients with low health literacy receive health information, they often conceal the fact that they do not understand the material provided to them (The Joint Commission, 2009). Patients with low health literacy are also less likely to ask questions of clinicians (Katz, Jacobson, Veledar, & Kripalani, 2007), have higher rates of hospital admissions, higher Emergency Room (ER) use (Berkman et al., 2011), and higher mortality in older adults (Bostock & Steptoe, 2012; IOM, 2004; NCES, 2004; Rudd, 2007). Furthermore, patients with limited health literacy are less likely to partake in preventative care and have an overall lower health status (Bostock & Steptoe, 2012; IOM, 2004; NCES, 2004; Rudd, 2007). Health literacy has also been identified as a predictor of self-efficacy in diabetes care (Ishikawa, Takeuchi, & Yano, 2008). Lower literacy was associated with less accuracy in estimating portion-sizes (Cavanaugh, et al., 2009) and more likely to refuse preventative screenings, even when recommended by their health care provider (Katz, Jacobson, Veledar, & Kripalani, 2007). Complicating the patients experience is that healthcare providers have difficulty detecting patients with limited health literacy (Cavanaugh, et al., 2009).

Physician Quality Reporting System

The Patient Protection and Affordable Care Act (ACA) not only expanded health insurance coverage and access to care in the nation, but it also impacted healthcare provider reimbursement. The Physician Quality Reporting System (PQRS) is a list of quality-driven measures created by the Centers for Medicare and Medicaid Services (CMS) in order to improve patient outcomes and increase patient safety (CMS, 2016). The CMS releases updated PQRS measures each year that drive future reimbursement for individual or group practices. Reimbursement depends on satisfactory reports according to the CMS specified measures. The measures quantify evidence-based recommendations for management of care in both inpatient

and outpatient settings (CMS, 2016).

By reporting PQRS quality measures, individual and group practices can quantify how often they are reporting and meeting a particular quality metric. In 2015, the program began applying a negative payment adjustment to practices that did not satisfactorily report data and/or meet PQRS measures. The negative payment adjustment is equal to a percentage of the practice's estimated total billable Medicare Part B services provided (CMS, 2016).

PQRS measure # 1 (NQF 0059): Diabetes: Hemoglobin A1c Poor Control – National Quality Strategy Domain: Effective Clinical Care. This PQRS measure observes the percentage of reported patients 18 – 75 years of age with diabetes who had a hemoglobin A1c > 9.0% during the measurement period (CMS, 2016). This measure is to be reported a minimum of once per reporting period as a calculated performance rate for patients that meet the criteria stated above. A lower calculated performance rate for this measure indicated better clinical care or control. The "Performance Not Met" numerator option for this measure is the representation of the better clinical quality or control (CMS, 2016). Two questions derived from this measure that will be important in program evaluation include:

- What percentage of patients have a HbA1c > 9.0%?
- What is being done to decrease HbA1c levels?

Purpose

The purpose of this clinical research project is to evaluate the education provided to patients with diabetes. This project assessed patient and provider perception of the diabetic education provided in an urban primary care clinic. Patients with the diagnosis of diabetes or pre-diabetes had the option to participate in an interview. The patient interview assessed the perception, satisfaction, and understanding of the clinic's current diabetic educational methods. The providers also had the option to participate in an interview. The aim of the provider interview was to assess their perception of education and current methods of delivering diabetic education to their patient population.

Study Objectives

Aim 1#: Assess patient understanding and perception of current diabetic educational methods.

Aim #2: Determine if patients perceive the information provided as helpful to them in managing their diabetes.

Aim #3: Assess the provider's perception of education and current diabetic educational methods.

Aim #4: Assess patterns of service use of available resources within the clinic.

Aim #5: Assess patient satisfaction with diabetic education provided at the clinic.

The specific objectives for this clinical project are as follows:

a. Conduct a face-to-face patient interview regarding diabetic education provided in the clinic.

b. Conduct face-to-face interview with providers regarding their perception of and current methods for diabetic education.

c. Review participating patient charts in order to obtain diabetic treatment plan and HbA1c levels.

Prior to and after completion of this assessment, the questions to be addressed are:

1. What do patients and providers perceive as effective education?

2. Are the current education methods helpful to patients?

3. What, if any, are the gaps in diabetic education?

4. Is there a need for revising the clinic's current education methods?

5. What are the changes between providers in providing diabetic information?

Methods

This study was a single-center, cross-sectional quality-improvement study on the impact of patient education for the patient with diabetes. This study utilized face-to-face patient and provider interviews (Figure 6 & Figure 7). Once consent was obtained to participate in the study, the patient's electronic medical chart was accessed to obtain patient information, including: demographics, individual diabetic treatment plans, comorbidities, and their HbA1c level.

Setting

This research study took place at an urban primary care clinic the Midwest. This clinic provides services to residents in the north side of town. This urban primary care clinic sees an average of 18,200 patients per year and has been serving the community since 2000. The clinic currently employs five medical providers, two physicians and three nurse practitioners.

Sample

This research project consisted of two study samples: Population A consisted of clinic patients and Population B consisted of clinic providers. The final sample consisted of 20 patients and 4 clinic providers. Population A consisted of all patients being seen in clinic who have a

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known diagnosis for diabetes or pre-diabetes and were presenting to the clinic for management, evaluation, or assessment of their diabetes. The term 'Population A' always refers to this population. Inclusion criteria for Population A were: 1.) All patients with a diagnosis of diabetes or pre-diabetes 2.) Male and female patients; 3.) English speaking; 4.) Ages 18 – 89 years; 5.) All ethnic groups; 6.) Any literacy level. Exclusion criteria for Population A were: 1.) patients that do not speak English; 2.) a new patient to the clinic with a history of diabetes; 3.) any patients who have not been evaluated for diabetes; 4.) Patient with diagnosis of diabetes but was not being seen for diabetes; 5.) Declines to participate. The consent was only read in English due to inability of the Principle Investigator (PI) to translate into alternate languages. Study enrollment started when IRB approval was received. Recruitment for participation in the study ceased when 20 subjects consented to participate. Recruitment was not randomized due to time limitations to complete this quality improvement project in its entirety before April 1st, 2017.

Population B consisted of 4 subjects. Population B included all providers at this urban primary care clinic. Currently, there are five health care providers: two physician and three nurse practitioners; four of the providers participated in the provider interview. The inclusion criteria consist of all health care providers at this clinic. Exclusion criteria would be any individual who was not a medical provider at this urban primary care clinic. The term "Population B" will always refer to this population.

Subject Recruitment Methods and Privacy

Recruitment for Population A (patients): The PI recruited twenty participants at the time of their follow-up appointment for management of diabetes. Following their appointment with clinical personnel, the PI met with each potential participant in a private clinic room.   The project was described and the patient was asked about participation. If the patient agreed to participate, the PI obtained informed consent at this time. The PI conducted individual face-to-face interviews with the consenting patients (Figure 6). The subject was only asked once if they would like to participate. Participation in this study was voluntary. The decision to not participate in the study was respected and did not affect care provided at the clinic. Those who do not wish to participate were not penalized in any way. All patient information was kept confidential.

A cross − walk table was designed with the 20 patient records being assigned a study number so that no patient identifying information was used during the data collection and

analysis process. These study numbers replaced medical record numbers on all electronic data collection forms and electronic data used in data collection and data analysis so as to protect patient privacy. A master list containing study numbers with correlating medical record numbers will be kept in case further information needs to be collected from the patient's electronic medical record at a later date and to validate the accuracy of data. This document is kept on the University's REDCap (Research Electronic Data Capture), a secure, web-based application designed exclusively to support data capture for research studies. REDCap is encrypted behind a firewall and is located on the University's password protected site. The PI maintained study data with study numbers so as to perform further analysis and validate the accuracy of data. Data collected will be maintained for six years after study completion. All data, including data collection forms and the master list will be kept in electronic form on REDCap, which will be deleted according to the University's policy for deleting electronic files.

Recruitment for Population B (providers): The PI described the project to each of the providers and asked for participation in the study. The provider was only asked once if they would like to participate. Provider participation in this study was voluntary. The PI conducted individual face-to-face interviews with the consenting health care providers (Figure 7). Four of the five providers participated in the interview.

Data Collection

Approval from the Institutional Review Board (IRB) was obtained prior to the collection of data. This study was based on answers to interview questions and a chart review of participating patients. During data collection, patient records were accessed using the patient medical record number (MRN), and data was entered on to an electronic spreadsheet. Patient satisfaction of the clinic's diabetic education was obtained from responses to interview questions. The variables that were reviewed for this study included: demographic variables, co-morbidities, diabetic variables, and subjective data (Table 1).

Data Analysis

Descriptive statistics, including frequency distributions, means, and SD was used to describe patients' demographic characteristics. Frequency distributions were use to describe patient and provider interview responses. All data was evaluated using SPSS version 22 and a level of .05 was used for statistical significance.

Results

Sample Characteristics: Population A (patients)

Demographics. Of the 20 participating subjects, the mean age was 53, patients were Caucasian (45.0%) or African American (45.0%), and over half were female (Table 2).

First diagnosed. All participating subjects had a diagnosis of diabetes or pre-diabetes documented in their electronic chart. First diagnosis of diabetes was assessed in 5-year intervals and was evaluated using frequency statistics. The majority of participants (65%, n = 13) were diagnosed less than 10 years ago. Of the 20 patient participants, 25% have had a diagnosis of diabetes for 15 years or more (Figure 8). The results are:

- Less than 5 years ago: 40% (n = 8)
- 5 – 10 years ago: 25% (n = 5)
- 10 – 15 years ago: 10% (n = 2)
- > 15 years ago: 25% (n = 5)

Co-morbidities. The majority of subjects in this study had co-morbidities: hypertension (75.0%), hyperlipidemia (65.0%), and obesity (90%). Of the 20 subjects, 10% (n = 2) were overweight (BMI 25 – 29.9) and 90% (n = 18) were considered obese (BMI 30 or greater). The mean BMI was 38.8, with a range from 28.4 to 57.8 (Table 3).

HbA1c. All of the patients had HbA1c documentation at least yearly, with most having documentation at 3-month intervals. The mean of the most recent documented HbA1c was 8.23 and the mean of the previously documented HbA1c was 8.17. A total of 1 (5.0%) had pre-diabetes. The remaining 19 (95.0%) had a diagnosis of diabetes with an initial HbA1c of 6.5% or greater. Of the 20 participants, 35% (n = 7) have HbA1c of 7.0% or less, and 30% (n = 6) of the patients had HbA1c greater than 9.0% (Table 4).

Treatment plan. The patient's diabetic treatment was reviewed and evaluated using frequency statistics. Of the 20 patients, 15% (3) are managed without medications (diet and exercise only). In total, 40.0% (8) of participants receive oral antiglycemic medications, and 75% (6) of these 8 are on only one oral medication. A total of 9 participants (45.0%) were on insulin as a part of their individualized diabetes treatment plan (Table 5).

Sample Characteristics: Population B (providers)

Population B consisted of 1 medical doctor (MD) and 3 nurse practitioners (NPs). Two of the providers whom participating in this study have been at this practice for 7 years, one for 5 years, and one has been at the practice for 4 months.

Patient Satisfaction of Current Education

Of the 20 patients interviewed, 95.0% (19) study participants replied 'yes' when asked, "Do you feel like you get enough information on diabetes?" However, when asked if they received enough information and education on specific entities, such as, medications, diet, and exercise, responses varied. Responses to the question, "do you get enough information on …" are as follows:

- What diabetes is? *Yes = 85% (n = 17); No = 15% (n = 3)*
- Your diabetes medications (n = 17 patients)? *Yes = 82.4% (n = 14); No = 17.6% (n = 3)*
- Exercise goals and its effects on diabetes? *Yes = 70% (n = 14); No = 30% (n = 6)*
- What to eat and what not to eat? *Yes = 65% (n = 13); No = 35% (n = 7)*
- When to check your blood sugar? *Yes = 100% (n = 11); No = 0% (n = 0)*
- Blood sugar goals, both fasting and after meals? *Yes = 70% (n = 14); No = 30% (n = 6)*
- HgA1c goals? *Yes = 75% (n = 15); No = 25% (n = 5)*
- Insulin (n = 9 patients on insulin)? *Yes = 66.7% (n = 6); No = 33.3% (n = 3)*

Barriers to successful Glycemic Control

The patients are providers were asked the open ended question" What is the hardest part or main barrier to successful glycemic control?" Some providers gave one response and some gave multiple responses. Providers and patients both felt that diet is the hardest part/main barrier to successful management of diabetes. Patient responses were organized into the following themes (n = 20):

- *Diet:* 14 of 20
- *Medication compliance and/or taking insulin:* 5 of 20
- *Change in lifestyle:* 4 of 20

All of the providers felt that patients struggled most with adhering to a diabetic diet. Provider interview responses to this question are as follows (n = 4):

- *Diet:* 4 of 4
- *Exercise:* 2 of 4

- *Medication compliance:* 1 of 4

- *Participating in preventative measures (checking feet, eye exams, etc.):* 1 of 4

- *Managing co-morbidities:* 1 of 4

Educational Methods

Verbal. Frequency statistics was used to evaluate how education is provided (verbal or written) to patients within the clinic. One hundred percent (n = 20) of patients reported receiving verbal education, either alone or in combination with other educational methods from their PCP. This is the same finding of provider interview responses (Figure 9). All of the providers (n = 4) stated they provide verbal education, either alone or in combination with other methods, during scheduled appointments/conversations with their patients.

Written/Handouts. The clinic has multiple diabetic handouts that include both diagrams and written information. These handouts are available in the form of booklets, brochures, and pamphlets, and are available in both English and Spanish. The majority of patients (60%) reported that they have been given handouts on diabetes in the clinic, and 75% (n = 3) of providers reported distributing written material to their patients (Figure 9).

Of the patients whom received written material in the past, 50% (n = 6) of those reported receiving handouts within the last year. Of those who reported never receiving handouts, the vast majority (87.5%) said they would like to receive handouts in the future. The results are as follows:

- Have you ever been given handouts on diabetes in this clinic (n = 20)?

  - **Yes: 60% (n = 12)**

    - When was the last time you received a handout on diabetes (n = 12)?

      - *0 – 6 months ago: 5 of 12*

      - *6 – 12 months ago: 1 of 12*

      - *> 1 year ago: 6 of 12*

  - **No: 40% (n – 8)**

    - Would you like to receive handouts in the future?

      - *Yes: 7 of 8 (87.5%)*

      - *No: 1 of 8 (12.5%)*

Diabetic booklet: Population B responses. The clinic has a diabetic patient educational booklet, called *Living with Diabetes*, created by the American College of Physicians. All

patients diagnosed with diabetes are supposed to receive this booklet when they are first diagnosed with diabetes at this clinic. The booklet is available in both English and Spanish and is written at a third grade reading level. The booklet includes information on the pathophysiology of diabetes, correct portion sizes, examples on what to eat and what not to eat, and food options for breakfast, lunch, dinner, and snacks. There is also information on exercise, medications, administering insulin, and preventative screenings. Each section of the booklet contains written information, pictures, diagrams, and fill-in-the-blank goal settings pages. Only one provider had read the booklet from cover to cover and two had read pieces of the booklet. One of the providers felt verbal education was more important than written education, two providers stated it depends on the patient, and one provider felt verbal education was not more important than written education. Provider responses to interview questions are as follows:

- Have you read the diabetic booklet?
  - *Yes: 3 of 4*
    - *In entirety: 1 of 4*
    - *Partial: 2 of 4*
  - *Unaware: 1 of 4*
- Do you think verbal education is more effective than written educational materials?
  - *No: 1 of 4*
  - *Yes: 1 of 4*
    - *Why? "patient's reading ability and small doses of verbal education"*
  - *"Depends on patient" 2 of 4*
    - *Why? "patient's reading ability and small doses of verbal education"*

The three providers that answered 'yes' or 'depends on the patient' were asked why they felt this way. All three providers reported "being unaware of the patients reading ability" and "verbal education in small doses are every appointment is more effective" as reasons for verbal education being more important than written education.

Referrals to diabetic educator. There is a fulltime diabetic educator at this clinic. Of the 20 total patient participants, 40.0% (n = 8) were aware that they clinic had a diabetic educator on site, and only 30.0% (n = 6) had previously met with the diabetes educator. Contrasting to the 30% of patients who reported previously meeting with the diabetic educator, 75% of the providers stated they refer patients to the clinic's diabetic educator (Figure 9). In total, 70% (n =

14) of patients stated they would like to meet with the clinic's diabetic educator, either more often or for the first time.

Health Literacy of Handouts

Patient perception. Of the 12 patients who have received handouts in the clinic, 83.3% (n = 10) reported the diabetic handouts are helpful, 91.7% (n = 11) stated they read the material, none threw the handouts away, but none shared the handouts with family members. Ten of the eleven who had read the handouts (90.9%) felt the handouts are easy to read and understand (Table 7).

Provider perception. Of the providers, 2 of the 4 felt handouts were helpful, one provider was unaware of the diabetic handouts available at the clinic, and 2 stated it "depends on the patient." The two of the providers felt that handouts were not helpful due to "patient's reading ability" and "patient desire for more individualized education" (Table 7).

Future Educational Methods

All 20 participating patients stated they like and want continued verbal education from their provider. Participants also expressed interest in receiving education through additional methods, such as, written handouts (90%), handouts containing pictures and diagrams (75%), and meeting with a diabetic educator (70%) (Figure 10). Although the majority of patients (75%) expressed a desire for more education and involvement in managing their diabetes, 15% (n = 3) participants stated they do not want additional diabetic education from their provider. A response from one of these 3 patients was, "It does not matter how much information my doctor gives me. I am not going to change my life or limit what I eat just because I have diabetes."

Discussion

This study aimed to better understand patient understanding, perception, and use of diabetic education methods provided in an urban primary care clinic. The management of this highly debilitating, costly, and chronic disease has fallen on the shoulders of primary care providers. A key intervention in caring for the patient with diabetes includes diabetes self-management education (DSME) and support for persons with diabetes. Overall the study results and analysis demonstrates that the existing resources, if utilized, are graciously received by patients and they would like multiple forms of education.

Key Findings

Verbal education is the primary method of education in this clinic and patients are overall satisfied with the verbal education provided by their PCP. The majority of patients (65%) had HbA1c levels above the ADA recommendation of 7.0% or less. The majority of patients (45%) interviewed are on insulin as medical management of diabetes. All patients had at least one co-morbidity, and 90% were obese (BMI 30 or greater). Providers and patients both felt that diet is the hardest part/main barrier to successful management of diabetes.

There was a big disconnect between patient and provider responses regarding the diabetic handouts and what each population perceived as helpful. In the patient study population, 60% have received written handouts in the past, and 87.5% of those who have never received handouts were interested in receiving them in the future. Of those who have received educational handouts, 91.7% reported reading the material at home, 90.9% reported the material was easy to read and understand, and 83.3% reported the material helps them in their diabetes management. Contrastingly, only one of the providers felt diabetic handouts are helpful in the management of diabetes, and two providers think their patients read the handouts.

There is also a big disconnect between patient and providers concerning referrals to the diabetic educator. Only 30% of patients had met with the diabetic educator, but 75% of the providers reported referring patients to the diabetic educator. The study result of 30% is below the most recent national average. According to the CDC (2014c) 57.4% of patients with diabetes have attended a class with a diabetic educator in 2011. All patients interviewed want continued verbal education from their PCP, 90% want written education/handouts (with 75% requesting handouts containing pictures/diagrams), and 70% of patients stated they are interested in meeting with the diabetic educator in the future.

Diabetes Diagnosis

HbA1c. The most recent national data is an average HbA1c of 7.2% in patients with diagnosed diabetes (CDC, 2014b) and the ADA goal for HbA1c is equal to or less than 7.0% (ADA, 2017). The average HbA1c of 8.23 in this study is higher than the ADA goal. Of the total participants, 65% had a HbA1c greater than 7.0%, and 30% of participants had a HbA1c greater than 9.0%.

Treatment plan. The majority of patients are receiving some form of medication for their individualized diabetes medical management. The majority of the study participants were

on insulin (45%). This differs from national trends on diabetic treatment. In 2011, half of the patients with diabetes were treated with oral antiglycemic pills alone (50.3%) and 30.8% had insulin as a part of their diabetic treatment plan (CDC, 2013b). The study findings could be due to the small sample size.

Patient Satisfaction

Overall, patients reported satisfaction with verbal education provided in the clinic, with interests for additional written educational opportunities and requests for more education on diet. High levels of satisfaction were reported for education on: diabetes, medications, exercise, diet, blood sugar goals, HbA1c goals, and insulin. The lowest scoring education topic was on diet, with 35% of patients stating they do not receive enough information on what to eat and what not to eat.

Provider Barriers to Successful Glycemic Control

Provider confidence in patients. Most of the literature related to diabetes education focuses on patients, rather than clinicians, educational methods provided, or patient-clinician interactions, however, there are few studies on provider's perceptions, knowledge, and attitudes towards diabetes self-management education. This study revealed some lack of provider confidence in their patients to carry out DSME. In this study, one provider stated they "lack confidence in patient's willingness to adhere to self-management practices and recommendations" and one did not think patients benefited from diabetic education. According to the literature, a barrier to successful glycemic control is that clinicians feel there is non-adherence among patients to suggested lifestyle changes (Phillips et al., 2001; Spooner et al., 2016; Nam et al., 2011). Clinician beliefs, perceptions, and assumptions of their patient population are barriers to providing education (Phillips et al., 2001; Nam et al., 2011; Spooner et al., 2016).

Provider attitude. There is also literature to support that provider attitudes influence patient empowerment and leads to patient doubt in their ability to manage their health conditions (Puder & Keller, 2003). During this study, one provider suggested that providers are "burnt out" on educating diabetic patients. Provider attitude towards diabetes management influences their patients' adherence to the prescribed regimen (Puder & Keller, 2003).

Provider confidence in self and resources. Most providers consider diabetes harder to treat than hypertension (Larme & Pugh, 1998). Lack of clinician training was another identified

barrier to achieving glycemic goals in the diabetic patient population (Phillips et al., 2001; Nam et al., 2011; Spooner et al., 2016). According to Larme and Pugh (1998), clinicians doubted the efficacy of diabetes treatment and their own ability to carry it out. These findings suggest that clinician attitudes toward treatment efficacy can counteract diabetes management because both the patient and provider have frustrations about the management of diabetes. This may result in patients doubting that they can successfully control diabetes, affecting their empowerment in diabetes self-management. Studies suggest that most clinicians acknowledge that they lack effective communication tools and skills needed to counsel diabetic patients appropriately (Wens et al., 2005).

Educational Methods

Verbal education. Patients are satisfied with verbal education, which is the primary method for providing education at the clinic. Continuing to provide verbal education during each appointment, in addition to incorporating other methods of education may decrease HbA1c and enhance patient participation in management of their diabetes. Two systematic reviews found higher levels of patient satisfaction and patient knowledge when they received both written and verbal health information, compared to receiving verbal information alone (Isaacman et al., 1992; Jenkins et al., 1996).

Written education. High levels of satisfaction were reported from those who have received written education in the past. There is little data on the percentage of patients who receive educational material in the form of handouts. Many of the participating subjects reported interest in handouts in the forms of both written and pictures/diagrams. The clinic has multiple handouts available, including brochures, booklets, and nutritional guides. Most of these handouts have pictures and diagrams included as well. Increased utilization of the clinics existing handouts may provide patients with enhanced tools to manage their diabetes. The majority (87.5%) of those who have never received diabetic handouts reported they would find diabetic handouts helpful. The patient who responded "no" to this question is legally blind. He stated if the handouts were available in brail he would like to receive them. But because of his disability, he obtains most information/education through conversations and group settings.

Health literacy of handouts. There was a big disconnect between patients and providers concerning the health literacy of diabetic handouts. There was a high level of correlation between readability and usability of handouts among those who received diabetic handouts.

Contrastingly, when providers were asked if they think patients read written education, one said yes, two said no, and one was unaware that there were diabetic handouts available at the clinic. One of the providers felt verbal education was more important than written education and two providers stated it depends on the patient. One reason given as to why a provider felt verbal education was more important than written education is due to the "uncertainty of patient's reading ability" and the level of "patient involvement with their diabetes management."

Three patients reported not understanding medical paperwork given to them in the past. This misunderstanding is most associated with lab results. These patients stated they received lab results in the past that state their levels are high but there is no explanation on what that means. During an interview, a patient pulled out a discharge summary from a visit with a specialist. The patient pointed to the word "asymptomatic" and asked the meaning of that word. The patient went on to say that she "feels shame to ask questions to my provider because they (provider) are so smart and I don't want to appear dumb." Establishing rapport, making patients feel more comfortable, using teach-back method, and providing education in the patients preferred learning method may enhance the patient-provider relationship at this clinic.

Referral to diabetic educator. According to the CDC, Over half (57.4%) of patients diagnosed with diabetes have attended a diabetes self-management class (2014c), as opposed to the 30% of patients in this study. Study participants reported meeting with a diabetic educator as informative and useful. Many of the patients who had seen a diabetic educator at first diagnosis could recite information gained from that experience and stated they still use the tools and tricks taught in the class, even years later. The majority of patients reported interest in meeting with a diabetic educator, either in a group session or one-on-one. Those interested in group-meetings with a diabetes educator were also open to one-on-one meetings; however, those interested in one-on-one meetings with a diabetes educator were not open to group meetings. Multiple participants suggested quarter or bi-annual group meetings to discuss diet, exercise, and medications.

Not all patients were interested in meeting with a diabetic educator. Two response themes were identified in these patients: 1.) "I can't afford a diabetic educator or nutritionist" and 2.) "I don't have time to come here more than I already do." However, DSME provided through accredited individuals or entities is reimbursed by CMS (CMS, 2016). Follow up meetings for DSME are limited to 2 hours of billable services per beneficiary per year (CMS,

2016).

One patient stated that it was tremendously helpful to go when she was first diagnosed. Although she reports learning things at that meeting that she still uses to this day, she also reports that she only retained "surface level information" and did not understand everything that was told to her in that first and only meeting. She accredits this learning barrier is due to just learning that she has a lifelong condition that will affect every day of the rest of her life. She also states she was in denial of her new diagnosis in the beginning. She went on to say that it would benefit her and others with diabetes to return to one of these meetings once they have accepted/adjusted to this lifestyle change and have more knowledge of diabetes. She felt that if she went to another diabetic meeting that she would be able to understand more than just surface level information.

Stage of Change

The stages of change applied to both patients and provides when it comes to receiving and provided education. After interviewing the patients and providers and reviewing the results, I believe the patients are further along in the stages of change than provides. Most of the patients interviewed seem to be in the contemplation stage, whereas most of the providers interviewed were in the pre-contemplation stage (Figure 11). Many of the participating subjects were accepting of their disease condition and recognized what behaviors need to be changed in order to effetely manage their diabetes.   The majority of subjects report interest in increased education from their primary care provider; however, few reported an unwillingness to change their behaviors despite any amount of education from PCPs. Those unwilling to change behaviors stated they have had diabetes for a long period of time and they "are not interested in changing how they live." In addition, biased reports of willingness to change due to social desirability may exist in this study.

Some patients stated they feel as though providers are doing all they can but the problem is a behavioral issue. Five of the subjects stated that the problem is not with providers, but the problem lies with diabetic population. They went on to say that patients with diabetes can be given all the education and knowledge needed but as a whole they are not motivated to make the lifestyle changes required to adequately manage diabetes.

Future Educational Methods

Patient recommendations. The top three education methods of education were to continue verbal education, written education/handouts, and meetings with a diabetic educator.

The majority of participants requested receiving written education/handouts at three-month intervals, or during follow-up diabetes visit, with a minimum of receiving them yearly. The majority of patients wanted to "stay up to date on education" and wanted more specific information on foods, such as a guide on what to eat and what to avoid. They not only want specific goals for diet, but they want strategies on how to reach these goals. Many stated it is hard to exercise in the winter so they wanted to focus more on diet. In addition, many patients reported interest in meetings with the diabetes educator every three to six months. Other methods for education suggested by patients include, education sent through the mail, both post mail and emails. Most patients reported owning a government granted cellular phone and did not want follow-up phone calls due to the usage of minutes.

Provider recommendations. In order to address uncontrolled diabetes in the clinic, two providers suggested having more regularly scheduled referrals to the diabetic educator at least on an annual basis. In addition to yearly appointments, providers suggested for patients with a HbA1c is 8.0% or higher, receive an automatic referral to the diabetic educator at more frequent intervals. Also, providers suggested an individualized plan to be filled out with each patient. This would act as a prescription for diet and exercise with agreed upon goals by the patient and provider, thus providing more individualized care. Another suggestion was to evaluate patient's preferred learning methods and providing education in that method.

Limitations of the Study

Sample size and demographics. Several limitations were identified in the design of this study. The data were collected from one clinic, limiting the generalization of the study. Furthermore, the study sample was either Caucasian (45.0%) or African American (45.0%), and over half were female (85.0%). The interview was voluntary, therefore, a true measure of patient satisfaction with the diabetic material provided in the clinic is difficult to determine. Patients who canceled or were no-shows for their appointments were not included in this study. Also, randomization was not used for this study. Due to time constraints, only 20 patients participated in this survey.   The smaller sample size can make it difficult to find a statistical difference between data sets. Interviewing a larger population may provide stronger evidence. Additional research is recommended to include a large sample size with individuals of all demographics including age, gender, race, and ethnicities.

Family history and co-morbidities. Family history of diabetes or other health conditions, such as obesity, hyperlipidemia, and hypertension was not evaluated during this study. Some patients are more predisposed to these conditions due to hereditary. Also, social conditions, such as alcohol use and smoking status were not assessed in this study. These social determinants can affect patient compliance, BMI, hypertension, hyperlipidemia, and other health conditions.

Social desirability. Responder bias is another limitation of this study. Respondents may not feel comfortable providing true answers that present themselves in an unfavorable manner due to social desirability.   Also, data errors due to question non-responses may exist.   The number of respondents who agree and chose to participate in the interview may be different from those who chose not to respond, thus creating bias.

Health literacy assessment. This study did not use a formal health literacy assessment tool to evaluate the patient's health literacy level. Health literacy was assessed during the patient interview by asking if patients' felt the educational materials provided to them is easy to read and understand. Social desirability may have impacted patient responses to this question. Further research that utilizes a validated health literacy assessment tool is needed.

Organizational Recommendations for Change

Utilization of resources. An in-service needs to be done with the providers at this clinic to present these study findings to talk about the disconnect between patient and provider perceptions of written material and use of the diabetic educator. This in-service would aim to enhance the providers appreciation of all materials and resources currently available to them. When providers are either unaware, or do not see the value and important of educational materials then it can negatively impact the patients. Patients reported high satisfaction and usage of written handouts given in the clinic. The medical assistant can assess the patient's preferred learning method by administering an approved assessment tool during triage of patients presenting for an initial or follow-up diabetic appointments. The medical assistant can then automatically give handouts to every patient who prefers written education. It would be the medical assistant's job to dispense the handouts during triage and chart the type of education given in the patient EMR for the provider to review.

Leveraging the EMR and Health Information Technology. System-level interventions and a patient-centered approach are recommendations in the ADA Clinical Practice

Guidelines for diabetes management. Conducting individual assessments of patient goals will help guide providers in a patient-centered-care approach. A prompt could be incorporated into the clinic's EMR to assess patient goals for managing their diabetes. During each diabetic appointment, the provider and patient should discuss and establish diet, exercise, and HbA1c goals. Overtime, the patient and provider can discuss the status of the goals and make appropriate changes. This may result in decreased HbA1c levels and improved glycemic control.

Many of the CMS reporting measures for diabetes involve preventative care practices. The CMS required reporting measures for diabetes include:

- PQRS Measure # 1: HbA1c > 9.0% (indicating poor control of diabetes)

- PQRS Measure # 117: dilated eye exam in diabetic patient

- PQRS Measure # 119: Urine screening for microalbumin or medical attention for nephropathy in diabetic patients

- PQRS Measure # 126: diabetic foot and ankle care, peripheral neuropathy – neurologic evaluation

(CMS, 2016)

The clinic can adapt to this change in health care by creating a checklist in the patients EMR to guide providers to meet the requirements for diabetes. This written list can be scanned into the EMR annually, in addition to EMR automatic annual reminders for preventative services and referrals. Not only will this help with reimbursement, but would also improve patient care and patient outcomes.

Assessing health literacy. This study not only found that patients appreciate education in both verbal and written forms, but it also found that patients understand and utilize the diabetic education provided to them. Health literacy is not assessed in this clinic.   Providers felt the health literacy of the patient population was low, therefore, a health literacy assessment needs to occur to confirm or reject this assumption. Because it is impractical to assess health literacy in every patient, health literacy advocates suggest assessing health literacy in a sample population seen in the clinic (Weiss, 2007).   A health literacy assessment tool can be handed to patients when they arrive at the clinic and the tool can be scanned into the EMR to guide providers on how to provide education to that patient. This would also give providers insight to the prevalence of limited health literacy in their patient population.

The Rapid Assessment of Health Literacy in Medicine – Short Form (REALM-SF) and

the Short Assessment of Health Literacy – (SAHL) are two validated health literacy tools. The REALM-SF is a 7-item word recognition test (Figure 12). The patient has five second to read each word aloud and if they do not recognize a word the can say 'pass' and move to the next word (Arozullah, et al., 2007). A score of zero indicates a third grade reading level and a score below 4 indicates limited health literacy(Arozullah, et al., 2007). The patients will need repeated oral instructions, materials composed primarily of illustrations, audio, and/or videotapes, and these patients will probably not be able to read prescription labels (Arozullah, et al., 2007). The SAHL is available in both English and Spanish and is a 18-item health literacy tool (Figure 13). If the patient both correctly pronounces the word and chooses the accurate association word, then the item is marked correct. A score between 0 – 14 indicates low health literacy. More research is needed in health literacy and patient activation in the diabetic population before widespread changes can be recommended. Effective health education needs to consider both health literacy as well as patient activation and readiness to change.

   Referrals to diabetic educator. The clinic has a diabetic educator on site that could be further utilized for patient education, in addition to providing other forms of education. The ADA and the Academy of Nutrition and Dietetics identify four times when PCPs should assess and make appropriate referrals for DSME. These four times include: (1) at diagnosis, (2) at annual assessments, (3) when new complications occur, (4) during transitions in life and care (Ali et al., 2013). This study found that the majority of patients are not being referred to the diabetic educator. Prompts for yearly meetings with the diabetic educator could be incorporated into the EMR. Patient with a HbA1c is 8.0% or higher could be flagged for the provider or front desk clerk to call the patient and schedule a meeting with the diabetic educator at 3- to 6-month intervals.

<center>**Conclusion**</center>

   Ongoing support and education for the patient with diabetes is essential to meeting glycemic goals and adequately control diabetes and is dependent on both the patient and the provider. When appropriate medical management is combined with self-management education, glycemic control can improve significantly (CDC, 2016). A patient-centered care model is not only beneficial to managing diabetes, but is also a key measure of insurance companies. Diabetes is a lifelong condition requiring lifelong education. The diabetic patient population must work closely with their health care team in order to receive education and have ongoing

support to self-manage their health. Overall, patients are interested in receiving continued verbal education, as well as educational handouts and meetings with a diabetic educator. Providing patients with handouts at every visit in addition to yearly meetings with a diabetic educator may increase patient involvement in diabetic care, thus decreasing HbA1c levels.

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Table 1. *List of Variables per Category*

Category	Variable/Measures
Demographic Variables (patients)	
Age	Age of participants in years
Gender	Male, Female
Ethnicity	African American, Caucasian, Hispanic, Other
Diabetic Variables (patients)	
HbA1c	Measure of glucose control over 3-month period
Treatment Plan	How the individual is currently being treated for their diabetes: oral medications, insulin, diet and exercise
Comorbidities	HTN, HLD, BMI
Satisfaction Variables (patients and providers)	
Patient Satisfaction	Patient interview:12 item questionnaire
Provider Satisfaction	Provider interview: 9 item questionnaire

Table 2. *Population A Demographic Characteristics by Group*

Characteristics	n = 20 n (%)
Age in years, Mean (SD)	53 (12.3)
Sex	
Male	3 (15%)
Female	17 (85%)
Race	
Caucasian	9 (45%)
African American	9 (45%)
Hispanic	1 (5%)
Other	1 (5%)

Table 3. *Comorbidities*

Comorbidities		
Co-morbidity	Yes n (%)	No n (%)
HTN	15 (75.0%)	5 (25.0%)
HLD	13 (65.0%)	7 (35.0%)
BMI < 18.5 18.5 – 24.9 **25 – 29.9** **30 or >**	0 (0%) 0 (0%) 2 (10.0%) 18 (90.0%)	
Note: HTN (hypertension); HLD (hyperlipidemia); Overweight (BM: 25 – 29.9); Obese (BMI 30 or greater)		

Table 4. *HbA1c Trends*

HbA1c	Mean	< 7.0%	> 9.0%
Most recent	8.23	35% (7)	30% (6)
3 months prior	8.17	35% (7)	25% (5)

Table 5. *Diabetic Treatment Plan Results*

Treatment plan	%, n
Diet and exercise alone	15% (n = 3)
Oral antiglycemics	40% (n = 8)

Insulin
   Insulin only
   Oral + insulin
	45% (n = 9)
	15% (n = 3)
	30% (n = 6)

Table 6. *Patient Perception of Diabetic Education*

Do you feel like you get enough information on:	Yes n (%)	No n (%)
What diabetes is (n = 20)	17 (85.0%)	3 (15.0%)
Medications		
Oral antiglycemics (n = 14)	11 (78.6%)	3 (21.4%)
Insulin (n = 9)	6 (66.7%)	3 (33.3%)
Diet (n = 20)	13 (65.0%)	7 (35.0%)
Exercise (n = 20)		
Exercise Goals	14 (70.0%)	6 (30.0%)
Blood Sugar		
Blood Sugar Goals (n = 20)	17 (85.0%)	3 (15.0%)
When to check GLU (n = 12)	12 (100.0%)	0 (0.0%)
HgA1c (n = 20)		
HgA1c Goals	15 (75.0%)	5 (25.0%)

Table 7. *Interview Results - Health Literacy of Handouts*

| Patient Questions	Patient Responses	Provider Questions	Provider Responses
1. Do the handouts help you with your diabetes? (n = 12)	*a. Yes: 10 of 12* *b. No: 2 of 12*	1. Are current handouts are helpful to patients? (n = 4)	*a. Yes: 1 of 4* *b. "Depends on patient" 2 of 4* *c. Unaware: 1 of 4*
2. What do you do with the handouts after you leave the clinic? (n = 12)	*a. Read: 11 of 12* *b. Take home but not read: 1 of 12* *c. Throw away: 0 of 12* *d. Share with family member: 0 of 12*	2. What do you think patients do with handouts after they leave clinic? (n = 4)	*a. "Read" 1 of 4* *b. "Maybe Read" 1 of 4* *c. "Throw Away" 1 of 4* *d. "Depends on patient" 1 of 4*
3. Is the information easy to read and understand? (n = 11 patients who read handout)	*a. Yes: 10 of 11* *b. No: 1 of 11*	3. Do you think patients easily understand the information in the handouts? (n = 4)	*a. Yes: 2 of 4* *b. No 2 of 4*
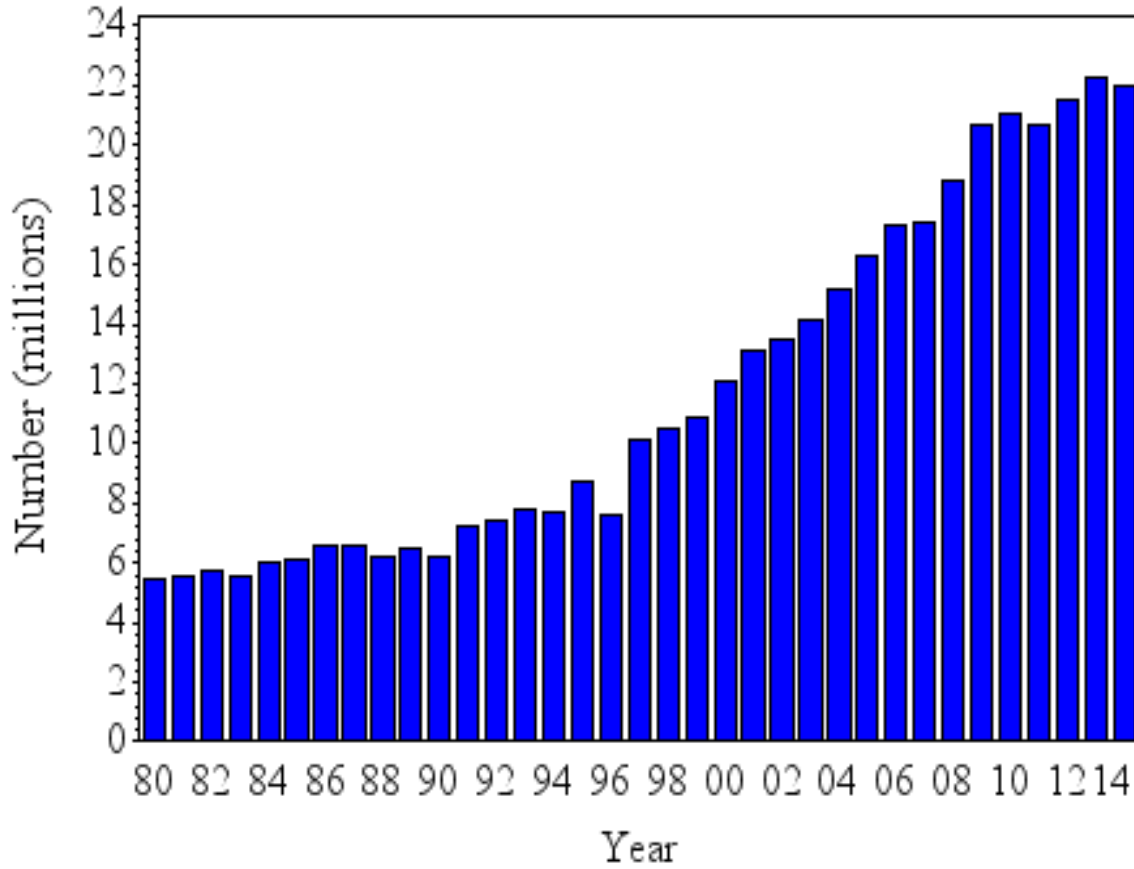
(CDC, 2015b)

Figure 1. *Number in Millions of US Adults Aged 18 or Older with Diagnosed Diabetes, 1980 -*

2014
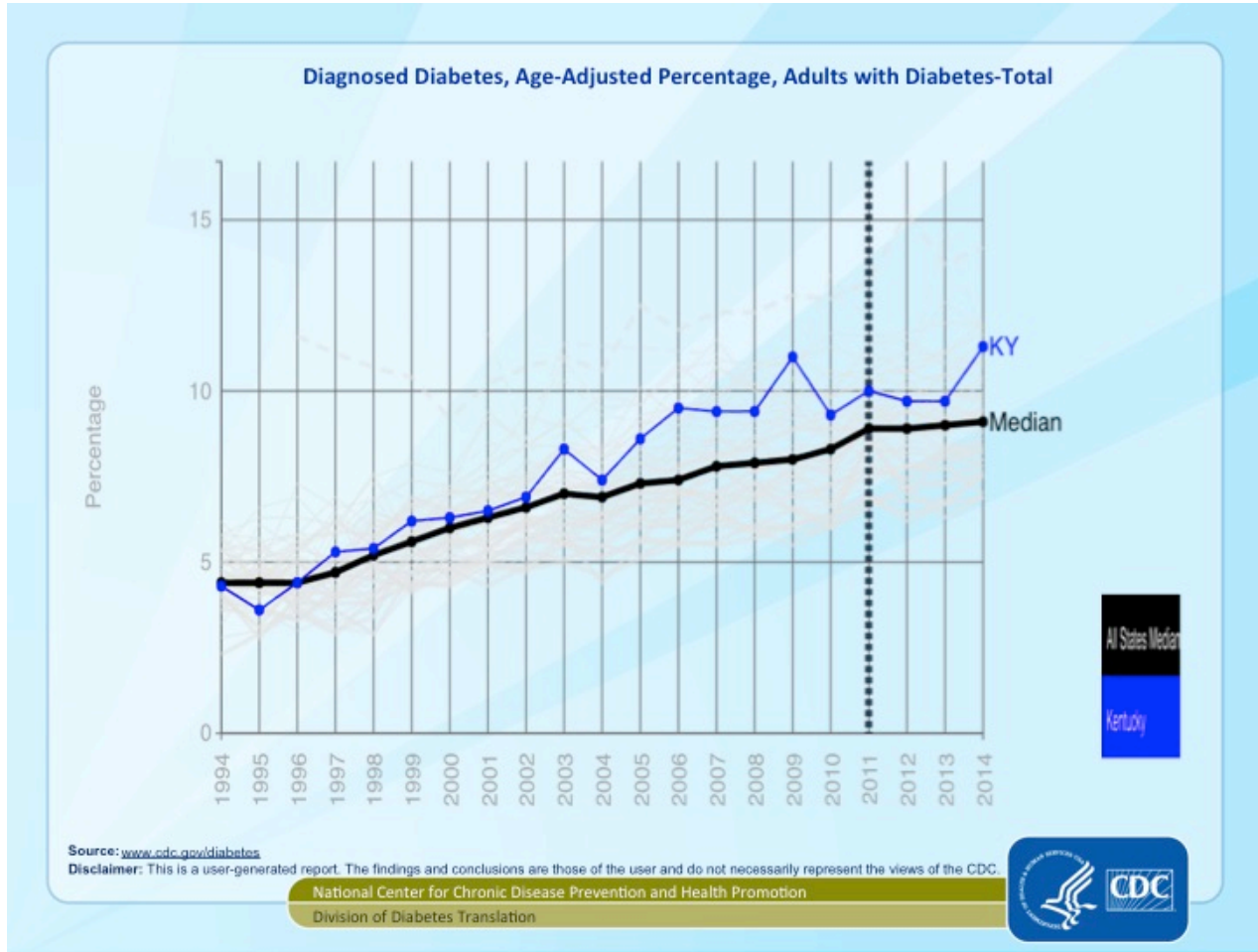
(CDC, 2014d)

Figure 2. *Adults with Diabetes, Age-Adjusted Percentages, 2014: Kentucky vs. Median Rate*

41
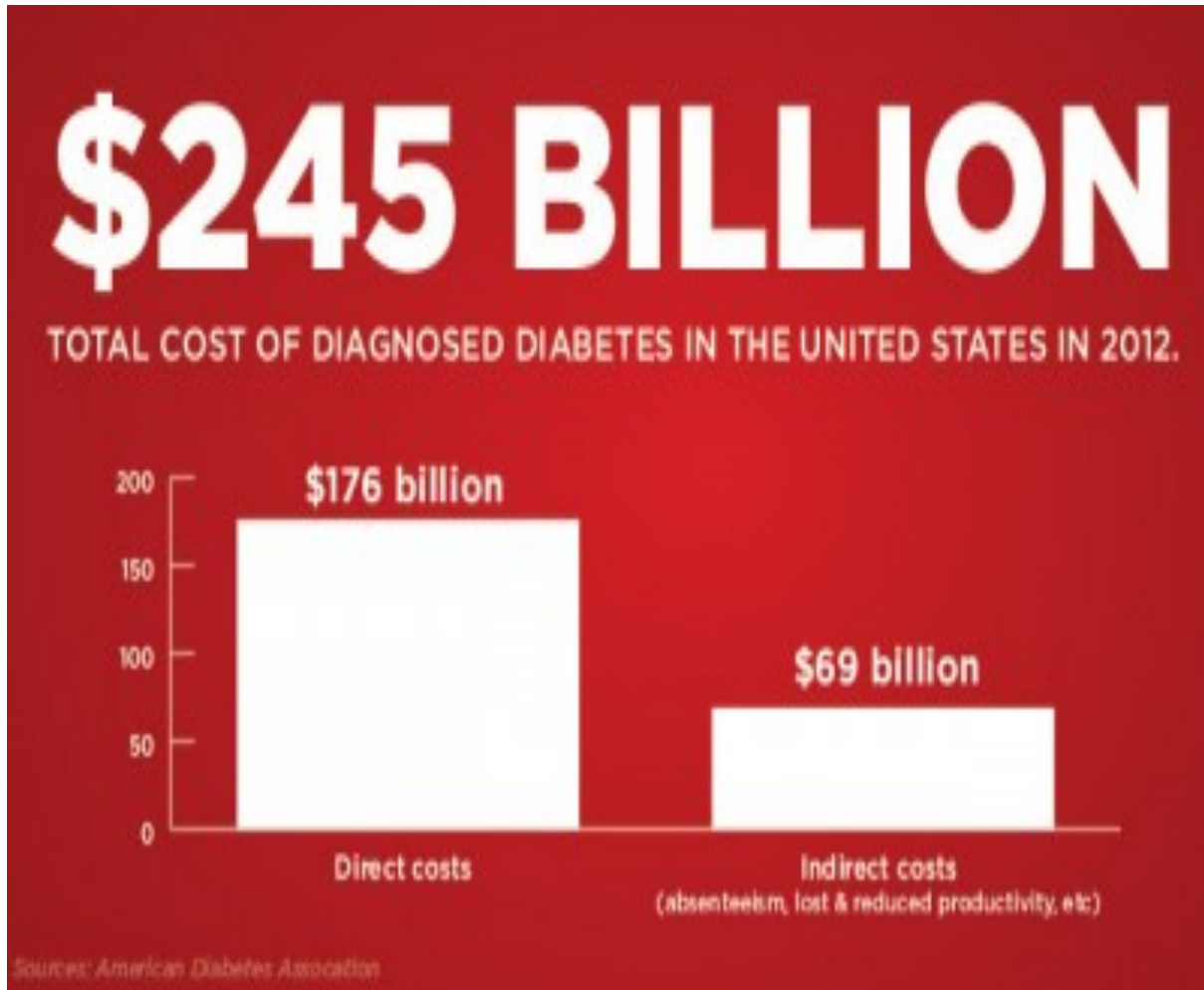
(ADA, 2017)

Figure 3. *National Cost of Diabetes*

(CDC, 2014d)

Figure 4. *Consequences of Diabetes*

DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT

Recommendations

- In accordance with the national standards for diabetes self-management education and support, all people with diabetes should participate in diabetes self-management education to facilitate the knowledge, skills, and ability necessary for diabetes self-care and in diabetes self-management support to assist with implementing and sustaining skills and behaviors needed for ongoing self-management, both at diagnosis and as needed thereafter. B
- Effective self-management and improved clinical outcomes, health status, and quality of life are key goals of diabetes self-management education and support that should be measured and monitored as part of routine care. C
- Diabetes self-management education and support should be patient centered, respectful, and responsive to individual patient preferences, needs, and values and should help guide clinical decisions. A
- Diabetes self-management education and support programs have the necessary elements in their curricula to delay or prevent the development of type 2 diabetes. Diabetes self-management education and support programs should therefore be able to tailor their content when prevention of diabetes is the desired goal. B
- Because diabetes self-management education and support can improve outcomes and reduce costs B, diabetes self-management education and support should be adequately reimbursed by third-party payers. E

(ADA, 2017)

Figure 5: *ADA 2017 Diabetes Care Recommendations – 4. Lifestyle Management*
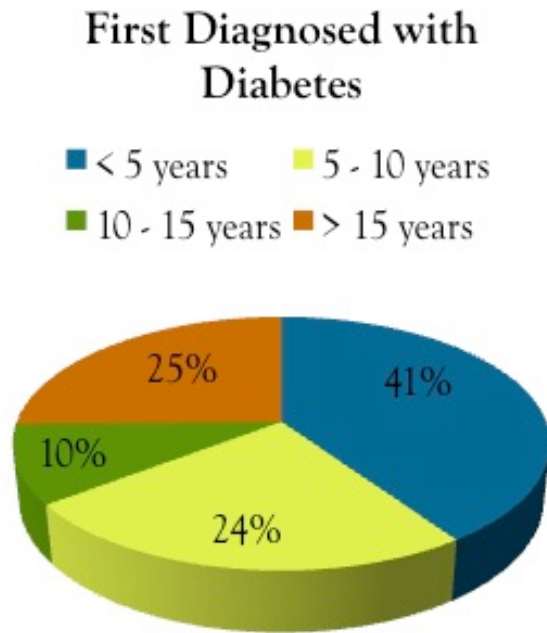
Figure 6. *First Diagnosed with Diabetes*
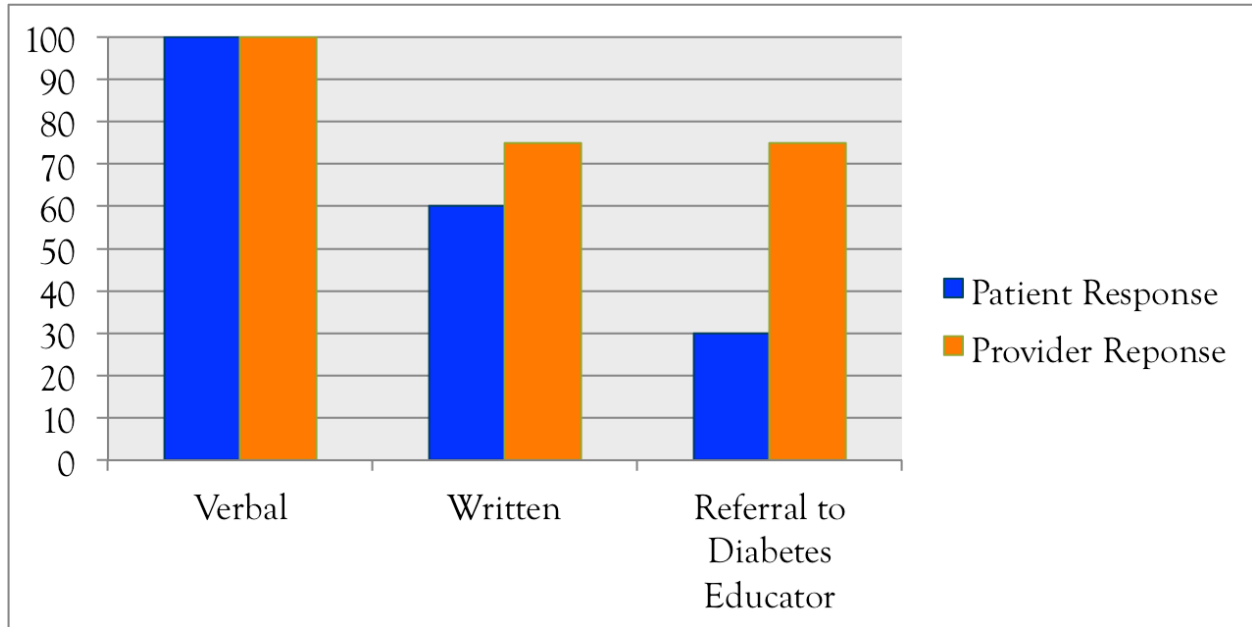
Figure 7. *Current Educational Methods*
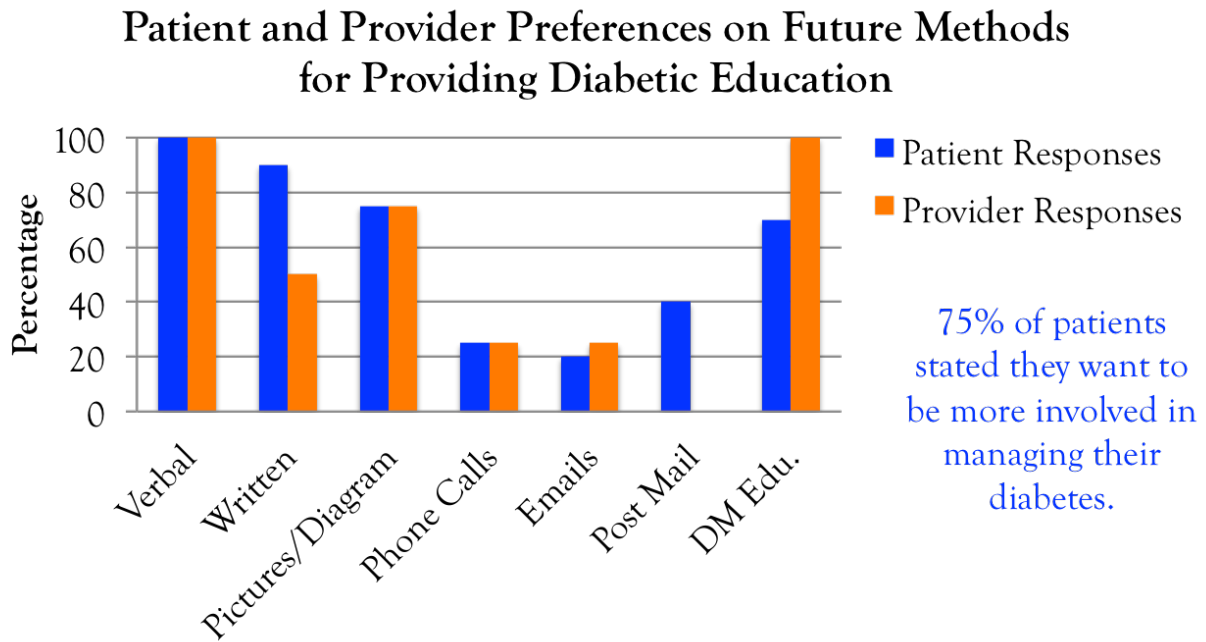
Figure 8. *Future Educational Methods*
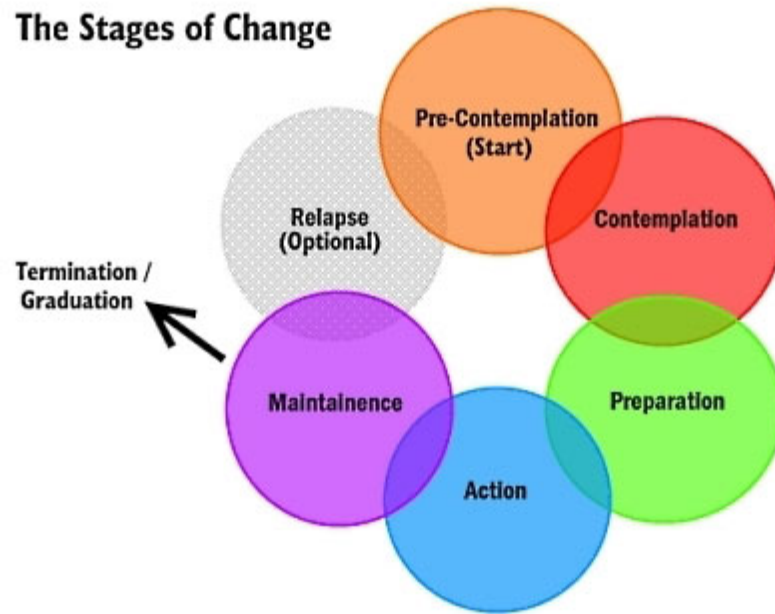
Figure 9. *Stages of Change*

Appendix A
Patient Interview Questions

1. When were you first diagnosed with diabetes?
2. What is the hardest part about having diabetes?

VERBAL EDUCATION

3. Do you feel like you get enough VERBAL information on how to take care of your diabetes? (yes/no)
4. Do you feel like you get enough VERBAL information on:
    a. Diabetes medications?
    b. Exercise goals?
    c. What to eat and what not to eat?
    d. When to check your blood sugar?
    e. Blood sugar goals, both fasting and after meals?
    f. HgA1c goals?
    g. Insulin (if patient is on insulin)?

WRITTEN EDUCATION

5. Have you ever been given handouts on diabetes in this clinic? (yes/no)
    a. If "yes" → when was the last time?
        i. 0 – 6 months ago
        ii. 6 – 12 months ago
        iii. >1 year ago
    b. If "no" → would you find handouts helpful? (yes/no) - skip to #10
6. What do you do with the handouts when you leave the clinic?
    a. Read
    b. Take home but not read
    c. Throw away
    d. Give to family
    e. Other: please explain
7. Is the information easy to read and understand? (yes/no)
8. Do the handouts help you with your diabetes? (yes/no)

DIABETIC EDUCATOR

9. Are you aware that this clinic has a DM educator? (yes/no)
10. Have you ever met with the DM educator at this clinic? (yes/no)
11. Are you interested in 1:1 or group session with the clinic's DM educator? (1:1/group/both/neither)

FUTURE EDUCATIONAL METHODS

12. How would you like to receive information on diabetes in the future? (you may choose none of the below or you may choose more than one answer)
    a. Written handouts
    b. Handouts in the form of pictures and diagrams
    c. Phone calls
    d. Mail: post mail &/or emails

Appendix B
Provider Interview Questions

1. What is the biggest barrier to successful glycemic control in your patients with diabetes?
2. How do you provide education to patients with diabetes? (please list all methods utilized)

VERBAL EDUCATION
3. Do you believe verbal education is more important than written education?
   a. If yes, please explain:
   b. If no, please describe why you feel that way:

WRITTEN MATERIALS
4. I am aware that the clinic has multiple diabetic handouts, including a diabetic booklet for patients. Do you think this booklet is helpful?
   a. If yes, please explain:
   b. In no, please describe why you feel that way:
5. Have you personally read the booklet?
6. Do you think the patients read the booklet?

DIABETIC EDUCATOR
7. How often do you refer patients to clinic's diabetic educator?

FUTURE EDUCATIONAL METHODS
8. What additions to the booklet do you think would be beneficial for future patient education? (you may choose none of the below or you may choose more than one answer)
   a. Additional written educational handouts
   b. Providing patients with website links
   c. Follow up phone calls
   d. Providing education that is not in written format, such as pictures and diagrams

9. Additional comments/suggestions for improving how patients receive information in this clinic:

Appendix C
The Rapid Estimate of Adult Health Literacy in Medicine – Short Form (REALM-SF)

REALM-SF Score Sheet

Patient ID #: _____   Date: _____   Examiner Initials: ____

Behavior   _____

Exercise   _____

Menopause   _____

Rectal   _____

Antibiotics   _____

Anemia   _____

Jaundice   _____

TOTAL SCORE _____

Administering the REALM-SF:

Suggested Introduction:

"Providers often use words that patients don't understand. We are looking at words providers often use with their patients in order to improve communication between health care providers and patients. Here is a list of medical words.

Starting at the top of the list, please read each word aloud to me. If you don't recognize a word, you can say 'pass' and move on to the next word."

Interviewer: Give the participant the word list. If the participant takes more than 5 seconds on a words, say "pass" and point to the next word. Hold this scoring sheet so that it is not visible to the participant.

Appendix D
Short Assessment of Health Literacy – English Version

The 18 items of *SAHL-E*, ordered according to item difficulty (keys and distracters are listed in the same random order as in the field interview)

Stem	Key or Distracter		
1. kidney	__urine	__fever	__don't know
2. occupation	__work	__education	__don't know
3. medication	__instrument	__treatment	__don't know
4. nutrition	__healthy	__soda	__don't know
5. miscarriage	__loss	__marriage	__don't know
6. infection	__plant	__virus	__don't know
7. alcoholism	__addiction	__recreation	__don't know
8. pregnancy	__birth	__childhood	__don't know
9. seizure	__dizzy	__calm	__don't know
10. dose	__sleep	__amount	__don't know
11. hormones	__growth	__harmony	__don't know
12. abnormal	__different	__similar	__don't know
13. directed	__instruction	__decision	__don't know
14. nerves	__bored	__anxiety	__don't know
15. constipation	__blocked	__loose	__don't know
16. diagnosis	__evaluation	__recovery	__don't know
17. hemorrhoids	__veins	__heart	__don't know
18. syphilis	__contraception	__condom	__don't know

Instruction for Administering *SAHL-E*

***SHORT ASSESSMENT OF HEALTH LITERACY-ENGLISH* (*SAHL-E*)** **Interviewer's Instruction**

The *Short Assessment of Health Literacy-English*, or *SAHL-E*, contains 18 test items designed to assess an English-speaking adult's ability to read and understand common medical terms. The test could help health professionals estimate the adult's health literacy level. Administration of the test could facilitated by using laminated 4"×5" flash cards, with each card containing a medical term printed in boldface on the top and the two association words—i.e., the key and the distracter—at the bottom.

Directions to the Interviewer:
 	
1   Before the test, the interviewer should say to the examinee:
    "I'm going to show you cards with 3 words on them. First, I'd like you to read the top word out loud. Next, I'll read the two words underneath and I'd like you to tell me which of the two words is more similar to or has a closer association with the top word. If you don't know, please say 'I don't know'. Don't guess."
 	
2. Show the examinee the first card.
 	
3. The interviewer should say to the examinee:
    "Now, please, read the top word out loud."
 	
4. The interviewer should have a clipboard with a score sheet to record the examinee's answers. The clipboard should be held such that the examinee cannot see or be distracted by the scoring procedure.
 	
5. The interviewer will then read the key and distracter (the two words at the bottom of the card) and then say:
    "Which of the two words is most similar to the top word? If you don't know the answer, please say 'I don't know'."
 	
6. The interviewer may repeat the instructions so that the examinee feels comfortable with the procedure.
 	
7. Continue the test with the rest of the cards.
 	
8. A correct answer for each test item is determined by both correct pronunciation and accurate association. Each correct answer gets one point. Once the test is completed, the interviewer should tally the total points to generate the *SAHL-E* score.
 	
9. A score between 0 and 14 suggests the examinee has low health literacy.