

2019

Improving Provider A1C Testing Frequency Adherence to Recommended Diabetes Guidelines

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Walden University

College of Health Sciences

This is to certify that the doctoral study by

Susan Simmons

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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2019

Abstract

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Guidelines

by

Susan A. Simmons

MSN, Wheeling Jesuit University, 2008

BSN, West Virginia University 2005

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

February 2019

Abstract

The Appalachian region of the United States has a high prevalence of diabetes, placing residents with diabetes at risk for physical, psychological, social, and financial burdens. To compound the issue, primary care providers often do not adhere to the guidelines established by the American Diabetes Association (ADA) regarding the recommended frequency of testing hemoglobin A1C in patients with diabetes. Lewin's planned change theory guided the project. The purpose of this project was to measure the knowledge of the primary care providers before and after an educational intervention covering the ADA guidelines for A1C monitoring and testing and to assess compliance with the guideline. The 12 volunteer participants were medical doctors, physician assistants and family nurse practitioners who served as primary care providers for a rural health clinic. Results of the educational presentation and the pre- and posttests indicated that providers improved in their knowledge of the ADA guidelines for prevention and management of diabetes. Providers identified 9 reasons that patients were not compliant with follow-up for A1C monitoring, including lack of provider knowledge of the guidelines, distance to travel to the clinic, delayed lab results, forgetting to keep appointments, bad weather, no transportation, lost orders for labs, fear that the A1C will be elevated, and fear of having more medications added to their treatment plan. This project has the potential to promote positive social change by raising awareness among providers of the need for regular monitoring of hemoglobin A1C and following the ADA guidelines for the treatment and management of diabetes. In so doing, the project may reduce the complications of diabetes for patients in the community.

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Dedication

The dedication of the work put forth in this endeavor as part of the requirement receiving the Doctor of Nursing Practice Degree is in memory of my mother, Doris June. She supported me in the pursuit of becoming a nurse and to help others.

Acknowledgments

I would like to identify a special thank you to my husband, Rocky, daughters, Jenna, Katie, son-in-law, Tyler, sister, Rhonda, father, Carl, and very best friend, Dottie for all the support and encouragement given to me in order to fulfill a lifelong dream and goal. Additional acknowledgement of thanks goes to the rest of my family, friends, and colleagues, Walden University Doctor of Nursing Practice nursing faculty and project committee chair and members to enable me to reach this point in my academic career.

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Section 1: Nature of the Project

Hemoglobin A1C History for Testing and Treatment

The glycosylated hemoglobin A1C (A1C) test is a blood test that provides information about the patient's average levels of blood glucose over the past 3 months. The test is based on the attachment of glucose hemoglobin, with a normal A1C level being below 5.7% (Koenig et al, 1976). Since its discovery, researchers have determined that one component, A1C, was observed to be elevated in diabetic patients (Koenig et al., 1976). The valuable knowledge of the elevated A1C component has guided researchers to the realization it could be used in the treatment or diagnosis of diabetes mellitus (DM).

In 1984, the additional knowledge of the A1C assay enhanced the use of A1C as an effective evaluation tool for the primary care provider (PCP), specifically for the evaluation of long-term glucose levels in diabetic patients (Little & Rohlfing, 2013). The challenge of using the A1C as a clinical evaluation tool is the lack of clinical guidelines; no central reference, laboratory data, or conclusive and accurate values as a reliable reference range available for clinical practice use and implementation (Little & Rohlfing, 2013).

The National Institute of Diabetes and Digestive and Kidney Diseases, a division of the National Institute of Health, conducted The Diabetes Control and Complications Trial from 1983 to 1993 of 1,441 patients with DM. The Diabetes Control and Complications Trial (1983 to 1993) determined the significance of keeping the patient's A1C to a level of 6%, drastically reducing risks of renal, cardiovascular, ophthalmologic,

and neurological systems. In 2013, Epidemiology of Diabetes Interventions and Complications continued with a follow up study that tracked the majority of the participants in the original study. The participants who kept their A1C levels between 6 and 7% had a decrease in the risk of cardiovascular complications (Lenters-Westra et al, 2013).

Incorporation of Hemoglobin A1C Into Clinical Practice

The American Diabetes Association (ADA; 1997) first introduced the A1C parameters into their standard of medical care in 1997. The most up-to-date standard for medical practice for A1C testing and DM management was published in 2013 and was considered to be the gold standard for the best possible patient care (ADA, 2013). The use in clinical practice includes diagnosing, screening, evaluation, and adjustment of diet and medications (ADA, 2013). The A1C test normal range is 5.5% to 7.0% and measures a daily average of the previous 90 to 120 days for the amount of glucose that comes into contact red blood cell hemoglobin molecules (ADA, 2013). The testing for the A1C in clinical practice is recommended to be done every 6 months (semiannually) for patients who are stable $< 7.0\%$, as per ADA guideline suggestions; if $\geq 7\%$, the A1C should be done every 3 months (quarterly) (ADA, 2013).

Significance of Diabetes in the United States

Diabetes is the seventh leading cause of death in the United States, according to the Centers for Disease Control and Prevention (CDC). In people with diabetes, the leading cause of death is contributed to cardiovascular disease; it is estimated that 68% of diabetics die of stroke or heart disease in the United States (CDC, 2011). Overall, the

diabetic population death risk is double of people without having diabetes (Centers for Disease Control and Prevention [CDC], 2011). It is estimated that 230,000 Americans die each year from complications of diabetes, according to the National Institute of Diabetes and Digestive and Kidney Diseases (U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes, and Digestive and Kidney Diseases, 2011).

In 2011, there were approximately 26 million people diagnosed with diabetes in the United States (CDC, 2011). The estimated total health care cost of diabetes is \$174 billion annually; broken down, the direct medical cost including treatment supplies, medical care, and hospitalizations account for an estimate of \$116 billion (CDC, 2011). The indirect covers cost such as time lost from work, disability payments, and premature death is estimated to be about \$58 billion (CDC, 2011). DM can lead to complications of cardiovascular disease, hypertension, stroke, kidney disease, amputations, and blindness (Diabetes Basics, 2013).

Significance of Diabetes in West Virginia

The Appalachian Region became as an entity by the federal government in 1969. It covers about 110,000 square miles in the states of Maryland, Virginia, West Virginia, Kentucky, Tennessee, North and South Carolina, and Georgia. The population of the Appalachian Mountain Chain is approximately 24.8 million people, with 42% of the population living in rural areas, including the entire state of West Virginia (WV) (The Appalachian Community, 2012). Geographically isolated throughout much of their history, the people of Appalachia are thought to have retained cultural traditions of the

early 19th century (The Appalachian Community, 2012). Lagging behind the United States, Appalachia continues to fall behind on social and economic indicators (The Appalachian Community, 2012). Thus, long-standing poverty and accompanying stresses continue to threaten the health of the people living in this region (The Appalachian Community, 2012).

Diseases and comorbid conditions such as diabetes, stroke, cardiac, cancer, and other associated health conditions and risks are frequently as high for many living in Appalachia as for other groups considered to be of national minority (The Appalachian Community, 2012). Recent population statistics for WV in November 2013 show that about 1 in 8 adults in WV have diabetes (The Appalachian Community, 2012). The most recent statistics for WV show the state to have between the second and fourth highest population of people to have diabetes in the country (Goss, 2013).

WV is federally designated as a Primary Care Health Professional Shortage Area (U.S. Department of Health and Human Services, 2013). More specifically, in rural WV, the problem of inadequate diabetes management is worsened by the absence of endocrinologists to provide specialized care to the diabetic patients in those rural areas (U.S. Department of Health and Human Services, 2013). The nearest endocrinologist specialist is sometimes two hours away. There are many people who do not own a vehicle or have reliable transportation to drive the required distance to the endocrinologist for diabetes monitoring or management (U.S. Department of Health and Human Services, 2013). Thus, it is imperative for providers to follow recommended guidelines in order to maximize patient outcomes.

Diabetes has been monitored in WV through surveillance and statistic centers. Through this monitoring, facts about health equity and the social determinants of health in rural areas of WV were discovered. The reports through the Department of Health and Human Resources revealed that people with diabetes make less money and have less education. Counties with higher diabetes prevalence, also had lower income levels and more people with diabetes who were unable to work. There is a higher prevalence of people with diabetes who report they have an impairment that limits their activities, and people with diabetes have higher levels of life dissatisfaction (Stohr, 2012). Northcentral WV, during the years 2006 to 2010, had a low prevalence of DM at 7.9%. Higher levels of diabetes prevalence in the same report was in southern WV at 17.7% (Stohr, 2012).

In 2010, Novo Nordisk Pharmtech commissioned a comparison to be made for the years of 2010, 2015, and 2025 with statistics and projected percentages for people with diabetes in WV. In 2010, the approximate number of people living with diabetes was 268,554, with a prevalence of 14.68% of the state population of people living with diagnosed or undiagnosed diabetes (Changing Diabetes Barometer, 2014). In 2015, the approximate projected number of people living with diabetes was expected to be 290,113, with a projected prevalence of 15.92% of people living with diabetes (Changing Diabetes Barometer, 2014).

By 2025, the projected number of the people living with diabetes is expected to be 314,864, with a projected prevalence of 17.82% of people to be living with diabetes in WV (Changing Diabetes Barometer, 2014). According to Novo Nordisk Pharmtech's current and projected statistics, it is important to keep track of the population who is at

risk or who have diabetes, the kinds of management provided, such as monitoring the frequency of testing the A1C, and the results that are to be achieved.

Facts about the Appalachian rural clinics include the diagnosis prevalence rates among adults. According to the CDC (2011), in rural WV, the prevalence rate was in the high range (12.1–21.6%). According to the Institute for Alternative Futures, the estimated prevalence rates for 2015 was approximately 194,400 with diagnosed diabetes, another 95,700 with Type 2 diabetes that remained undiagnosed, and an additional 464,300 who had prediabetes (Changing Diabetes Barometer, 2014).

Problem Statement

Despite the standards of practice, diabetes continues to be a concern in the United States. Over 28 million people are being treated for the disease and treatment, costing 245 billion per year (Statistics About Diabetes, 2014). The use of ADA clinical practice standards and guidelines by the PCP can enhance the quality of care and patient outcomes for individuals with diabetes. However, the PCP practice problem can be a result of self-efficacy and lack of confidence in ability, leading to clinical inertia (Shaefer, 2006).

Purpose Statement

The purpose of the Doctor of Nursing Practice (DNP) project staff education is to measure the knowledge of PCPs from an educational intervention regarding the recommended ADA guidelines for A1C patient monitoring and testing.

Project Objectives

The objective of this DNP staff education project is to increase the knowledge of the ADA guidelines for A1C patient monitoring and testing among PCP in Appalachian rural clinics.

Project Question

Is there a difference in knowledge following an educational intervention regarding the ADA guidelines for A1C patient monitoring and testing among PCP in Appalachian rural clinics?

Evidence of Problem

The specific identified practice problem is the frequency of testing of the A1C in the Appalachian rural clinics. According to the ADA guidelines, routine monitoring of glycemic control using A1C by providers in clinic practice is often not completed during routine office visits (Egbunike & Gerald, 2013). Eighty percent of patients in the first year after diagnosis with diabetes do not have testing for A1C measurements during their office visits (Egbunike & Gerald, 2013).

Strategies and tools such as electronic chart provider reminders for testing of A1Cs are underused in the rural clinics. In order to provide safe, effective, and quality care to the patients in the Appalachian rural clinics for prevention, diagnosing, and monitoring of diabetes, it is imperative to have tools and strategies in place to educate, remind, and ensure the PCPs follow the ADA guidelines.

The PCP in the Appalachian rural clinics should adhere to the recommended frequency for doing A1C testing, according to the ADA guidelines for diagnosing and

management of Type 2 diabetes. Monitoring by obtaining the A1C at regular intervals in the rural clinic helps to provide the diabetic patient with safe and effective care that has optimal outcomes (Egbunike & Gerald, 2013) However, some PCPs do not adhere to or use the recommended evidence-based practice (EBP) guidelines as outlined by the ADA for the testing and frequency intervals of obtaining the A1C measurements (Egbunike & Gerald, 2013).

Optimal outcomes of quality care in the DM patient require the timely testing of A1C in order to prevent poor diabetes management or control. Patients with poor or uncontrolled DM are at increased risk for organ damage and other complications, including macrovascular and microvascular complications (Egbunike & Gerald, 2013). DM patients with the macrovascular and microvascular complications are at a greater risk for glaucoma, neuropathy pain, peripheral amputations, and nonhealing wounds (Egbunike & Gerard, 2013).

The standardization of the A1C measurements in recent years has been endorsed by the World Health Organization as a diagnostic criterion for the diagnosing and management of diabetes. In 2009, the ADA supported and recommended the use of A1C, along with many other major professional diabetes associations. The World Health Organization and ADA have recognized the advantages of using the A1C since no fasting is required by the patients with less measurement variability than levels of plasma glucose (Smith, 2012).

Implications for Social Change

This DNP proposal is significant for social change because EPB literature has confirmed that diabetes is a health problem for people in rural WV. Appalachian rural clinic PCPs currently do not have standard tools in place to monitor the frequency of A1C testing for the patient at risk or who already has diabetes Type 2. The ADA guideline literature has indicated that following the clinical practice guidelines for the frequency of A1C testing helps to provide the diabetic patient with safe and effective care with optimal outcomes. The social change will improve and impact the individuals in the Appalachian patient population by helping to control diabetes by the PCP use of the ADA A1C clinical practice guidelines.

Definition of Key Terms

The definition of key terms that are often used in duplication and throughout this study include the following:

American Diabetes Association (ADA): A professional association whose goal is to educate and help those who are affected by the consequences of diabetes, provides objectives and credible information about diabetes, and funds research to manage, prevent, cure, and deliver services to communities (ADA, 2013).

Appalachian region: The Appalachian Mountain Chain and rural areas, including the entire state of West Virginia (The Appalachian Community, 2012).

Diabetes mellitus (DM) or Diabetes: A condition (hyperglycemia) that results because the body is no longer able to use blood glucose for energy. Type 2 diabetes

occurs when the pancreas is unable to use the insulin correctly or not enough insulin is made (ADA, 2013).

Glycosylated hemoglobin A1C (A1C): A lab test that measures the previous 90 to 120-day (2 to 3 months) average of the glucose amount that has contact or sticks with the red blood cell hemoglobin molecules (ADA, 2013).

Assumptions and Limitations

In this project, there are more limitations than assumptions. I assumed that providers want to do what is right or is considered to be best for the patients they care for in clinical practice (see Shaefer, 2006). Another assumption is that educating the providers will change practice, and changing practice will improve health. I also assumed that the patient wishes to become involved in his/her care for the improvement of his or her health.

Limitations for the use of clinical practice guidelines that can occur in the rural clinics are that the provider incorrectly ordered the A1C test. Overuse of testing and resources adds additional unnecessary cost to the patient and health care system. The standards are patients with A1C values that were $\leq 7\%$; according to the ADA (2013) clinical practice guidelines, the A1C does not need to be ordered again for a year.

If the A1C testing is done more often than necessary, it is evident that PCPs need support in the learning process and continued education. The geographical area where the rural clinic was located can be a limitation to the frequency and PCP adherence to following the EBP ADA guidelines. The area has harsh weather during the winter

season; snow, cold, and ice can be a reason the patient may not be able to make it to their provider for scheduled appointments or have A1C testing completed in a timely manner.

Lastly, a limitation that could occur in the rural PCP is the tracking of A1C testing. The rural clinics have electronic health records (EHR); however, not all documents are typed in a timely manner. The progress note is scanned into the EHR directly after the provider visit. However, the provider has to take the time later to get it typed; there are times because of the increase in patient load that the notes do not get typed for several weeks. Therefore, the tracking system cannot be used correctly to monitor the frequency of A1C testing.

Summary

In summary, the Appalachian rural clinic PCPs currently do not have standard tools in place to monitor the frequency of A1C testing for patients at risk or who already have diabetes Type 2. Testing for the A1C by PCPs in clinical practice is often not completed during the patients routine office visits. The ADA and other EBP literature has indicated that following the clinical practice guidelines for the frequency of A1C testing helps to provide the diabetic patient with safe and effective care with optimal outcomes. Diabetes is an issue in the rural community and in WV. Having adequate healthcare and diabetic management is critical to providing high-quality diabetes care to the Appalachian rural population.

The practice problem for the DNP staff education project is that some PCPs need to be made aware and knowledge and understanding about the ADA guidelines. The PCP

practice problems can be a result of self-efficacy and lack of confidence in ability, leading to clinical inertia (Shaefer, 2006).

Section 2: Background and Context

Introduction

I conducted a literature review and comprehensive search to obtain EBP literature and studies related to the monitoring of the provider frequency for A1C testing and frequency in the Appalachian rural clinics (see Burns & Grove, 2009). The literature review was also necessary in the search for clinical practice ADA guidelines, the self-efficacy and ADA guideline agreement, and the ADA clinical practice guideline adoption. In this section, I also cover the theoretical framework, and EBP model using scholarly data that provide a foundation for the development of the plan for patient management of DM.

The search strategy included a systematic approach consisting of a detailed search, including *Publisher Medline*, *Nursing & Applied Health Sciences*, *Cumulative Index to Nursing and Allied Health*, *Ovid Nursing Journals Full Text*, and *Medical Literature Analysis and Retrieval System Online*. Other online searches were conducted through Mozilla Firefox Google, where I found EBP material, data, and information such as but not limited to the ADA, Healthy People 2020, United States National Library of Medicine, and WV Department of Health and Human Resources.

I focused on EBP guidelines and studies written in the English language from early 2000 to 2014, with a small number of articles selected in the search process being prior to the year 2000 because no recent information and literature were comparable. The search produced 496 articles, dissertations, meta-analyses, systematic reviews, peer-reviewed articles, comparison studies, randomized control trials, cross-sectional analyses,

experimental research studies, and journal articles with guidelines and models. A final number of research articles used in the DNP pilot project was 16. The search words used for the database search were *glycosylated hemoglobin A1C, Hgb A1C, A1C, diabetes mellitus, diabetes, rural diabetes care, diabetes outcomes, and frequency of A1C testing.*

Literature Review

ADA Guideline Awareness and Adherence

Physician and provider adherence are crucial in interpreting recommendations into improved patient outcomes (Cabana et al, 1999). The National Clearinghouse of Guidelines provides sources to assist health care providers with guidelines on many clinical issues. The EBP database is available to the public for free (U.S. Department of Health and Human Services AHRQ, 2014).

The patients where adherence was followed according to the ADA guidelines for the frequency of monitoring the A1C in rural PCP had better A1C diabetes control than those where the ADA guidelines were not followed (Parcero, Yaeger & Bienkowski, 2011). This provides strong empirical support in adherence of following the A1C frequency to the ADA guideline (Parcero et al, 2011). The monitoring and measurement of glycemic control are considered a basis for management for patients with DM. Having the A1C lab results at the point of care during patient visits results in an increase in the use in therapy and an improvement in the patient's glycemic control (Neumiller et al., 2010).

Interventions by physicians in clinical practice including feedback about glycemic control monitoring of A1C has led to improved diabetic patient care in Medicare

beneficiaries (McClellan, et al., 2003). In general, patients in rural communities need greater attention to diabetes care. The ADA recommendations are for the A1C testing to be completed every 3 months. In this study, I focused on physicians, physician assistants, and nurse practitioners, finding that PCPs are slow to accept standards of care for diabetes care and management (Glasser, Peters, Warner, Burkholder, Sharp, McGee, 2010). In 2011, Parcerro, Neumiller, McClellan, and Glasser concluded that the lack of awareness or knowledge about the guidelines and its objectives has resulted in low adherence to the frequency of A1C testing.

ADA Guideline Agreement and Self-Efficacy

Use of the ADA guidelines by the PCP can help to increase glycemic control; by doing this, the incidence of comorbidities related to DM Type 2 is reduced (Schaefer, 2006). A PCP's lack of self-efficacy leads to clinical inertia. Clinical inertia is described as a provider's unwillingness or inability to intensify medication treatment in patients whose glycemic control is nontherapeutic (Schaefer, 2006).

The physician or provider finds patient poor adherence to be because of having low self-efficacy. Low adherence is due to the lack of preparation or lack of confidence in ability. Researchers have suggested that the barrier is associated with counseling and preventive health education, suggesting that poor self-efficacy may be a common barrier to adherence for EBP health care and management guidelines (Cabana et al., 1999). Self-efficacy is the confidence and belief that a person can perform a behavior; it also impacts whether the behavior will be started and continued in spite of poor outcomes (Cabana et al., 1999). A low self-efficacy that is due to a lack clinical inertia is considered to be a

problem that occurs commonly by providers when managing illnesses that did not present in a systematic way (Cabana et al., 1999). Clinical inertia is caused by the recognition of a problem, not necessarily by the failure to act on the problem. Some providers may be quick to lay the blame on the patient's noncompliance; however, researchers have shown that clinical inertia is the problem of the physician and provider delivery system, along with the health care system that did not take appropriate action for the benefit of that patient (Cabana et al., 1999). Clinical inertia can be applied to silent chronic diseases such as diabetes, hypertension, and hyperlipidemia.

In diabetes, some providers have failed to screen, diagnose, manage, or treat a patient with diabetes at an acceptable A1C level of $< 7\%$. The failure has been in spite of the 2011 CDC, current data that show that diabetes is an epidemic expanding problem in the United States. Society is well aware of DM with print media, such as popular magazines and television advertisements concerning DM (Shafer, 2006).

Clinical inertia is directly recognized as a lack of self-efficacy because of the provider having an attitude barrier. The provider having a casual awareness of the guideline recommendations does not guarantee the familiarity of A1C guidelines and the actual ability to use them correctly (Cabana et al., 1999). The providers in rural PCPs with adherence to the ADA guidelines for frequency of monitoring hemoglobin A1C had patients with better glycemic control of diabetes than those who did not; therefore, this provides to be strong empirical support for the guidelines (Parcero et al, 2011). In order to end clinical inertia, the PCP barrier of awareness requires both guideline knowledge and a change in provider behavior (Vigersky, 2011).

ADA Guideline Adoption

Full adoption of the clinical guidelines requires that the PCPs agree with the guidelines (Massey, Appel, Buchanan, Cherrington, 2010). As part of this adoption of the EBP ADA guideline, the PCP should acknowledge the A1C as the standard method of monitoring diabetes, thus increasing the patient's glycemic control (Parcero, 2011). The PCP requires both guideline knowledge and a change in provider behavior. PCPs use the A1C testing and monitoring to educate the patient, make changes in the patient's diet, provide recommendations for exercise, and adjust the medication regimen (Vigersky, 2011).

The PCPs that understand the ADA clinical practice guidelines are likely to be involved in different approaches to reach their patient population in the community, such as EBP ADA guidelines regarding the frequency of A1C monitoring and testing in primary care setting (ADA, 2013). In addition, there is an increase in the patient's mortality and morbidity with poor control of glycemic levels (ADA, 2013).

Theoretical Framework/ Evidence-Based Practice Model

The DNP Essential I of nursing practice examines nursing theory and science that focus on the concepts to strengthen and support the DNP practice (Zaccagnini & White, 2011). EBP models, and theoretical framework are used by the DNP to help in the organization and integration of nursing knowledge, practice, and science. Theories and models can also offer a systematic way to clarify the parameters of nursing practice to benefit the DNP project to improve compliance of A1C testing following the EBP clinical ADA guidelines (Zaccagnini & White, 2011). The project requires a

strengthening in clinical practice by the health care PCP in the rural clinic. To help in the change process of clinical practice using the ADA clinical practice guidelines will be the use of Lewin's planned change theory and the plan-do-study-act (PDSA) improvement model

Theoretical Framework

Today's healthcare is in a constant state of change. With change, come feelings of anxiety, uncertainty, and upheaval (McEwen & Wills, 2011). The theory applies to the DNP project for a smooth transition of the change in clinical practice for health promotion and disease prevention is the Lewin's planned change theory. A force of change according to Lewin is the driving force (McEwen & Wills, 2011). The DNP can be part of that driving force to help in the disease prevention and management of diabetes; thus, improving the overall outcome of the patient mortality and morbidity in a rural clinic. To be successful in the planned changed are unfreezing, movement, and refreezing. (McEwen & Wills, 2011).

There are three phases of Lewin's planned change theory for the rural clinic:

1. Unfreezing – involves meeting with the primary care providers to discuss a need for the change in clinical practice to follow the ADA guidelines for frequency of A1C testing in the diabetic patient to alleviate any stress or uneasiness about the process.
2. Movement – Prior to the initiation of change, research of diabetic patient population, education materials, ADA guidelines for use by for the primary care providers in the rural clinic, and feasibility of the change in practice.

3. Refreezing – Stabilization occurs, and the planned integration into primary care provider has initiated and uses the ADA clinical practice guidelines as part of their daily practice for monitoring of the A1C to improve glycemic control in the diabetic patients in the rural clinic.

(McEwen & Wills, 2011)

Evidence-Based Practice Model

Along with the Lewin's planned change theory; PDSA improvement model will be used by the DNP in the clinical practice change process for a smooth transition of all involved. A model that can be utilized in the rural clinic practice setting is the PDSA model for improvement. The PDSA model in particular was chosen because it can be simply used as a guide by the DNP to incorporate a systematic process for change to EBP (Pipe, 2007). The model's focus is for change to the EBP by using the PDSA (White & Dudley-Brown, 2012).

The PDSA steps are as follows: Plan - the change to be implemented or tested involves gathering baseline data. This stage is to test for quality improvement. Do - carry out the project on a reduced scale and change the processes as problems occur. At this stage, documentation of the process occurs along with the integration of data analysis. Study - set aside sufficient time to analyze the data. Act - analyze the data, plan revision, and restart the PDSA cycle (Institute for Healthcare Improvement, 2011).

Plan-Do-Study-Act Method

The appropriate method for implementation is the use of the PDSA method for the project in the rural clinic health care setting (Institute for Healthcare Improvement,

2011). The PDSA cycle identifies specific measures of change; then, test change in the actual work setting (planning, trying, observing, and acting) on the actual results about what is learned (Institute for Healthcare Improvement, 2011). The aim is to refine the improvement of the project by using the PDSA cycle. This is accomplished by advancing through the PDSA cycles numerous times eventually having the ability to apply the implementation of change on a broader scale basis throughout a larger healthcare system (Institute for Healthcare Improvement, 2011).

Summary

Change is important to improve patient outcomes in the current healthcare system (Hykas & Harvey, 2010). Coming up with new solutions by using research and EBP, then integrating the new knowledge into clinical practice is part of the leadership role used by the DNP nurse (Hykas & Harvey, 2010). The comprehensive literature search completed for the provider A1C frequency testing in the rural clinic setting program design came from different sources such as the Walden University library and other reliable online internet sources. EBP used for the DNP project development came from the ADA clinical practice guidelines. The EBP theoretical framework and model included the Lewin's planned change theory and the Plan-do-study-act improvement model and is applied to the EBP DNP project transition of the change in the Appalachian rural clinics.

Section 3: Collection and Analysis of Evidence

Introduction

The purpose of this section is to explain an improvement plan designed for a future full scale long term organizational process and evaluation plan. I discuss the project design and methods, the setting and participants with permission and protection, and an overview of the project design and evaluation plan using the PDSA. The DNP project is divided into five stages that represent portions of the PDSA cycle for future use at the Appalachian clinic.

Step 1 is plan. I assumed a leadership role in this project by educating the PCP through a Power Point presentation (Appendix A) on the importance of obtaining the A1C in the Appalachian rural clinics. I also reviewed all the objectives of the DNP project with the participants. I trained the head family nurse practitioner (FNP) on how to follow up with the administration of the pretest (Appendix B) to the providers; if needed, the head FNP will review the material again in the educational Power Point presentation (Appendix A).

Step 2 is do. The trained head FNP followed up with each of the providers participating to see if objectives were followed. If needed, there was remediation with a review of the educational Power Point (Appendix A) with objectives and a review of clinical inertia.

Step 3 is study. The head FNP administered the posttest (Appendix B) with the participating providers, collected all the data, analyzed the qualitative data, identified the

common themes, and prepared the final report that will be completed semiannually by the head provider in the Appalachian rural clinics.

Step 5 is act. Issued the final report to the members of the Appalachian rural clinic participants, members, and the administration. To keep me informed and involved, a report of the final data and outcome will be presented either via phone, personal visit, or e-mail.

Design of Staff Education

The purpose of the project was to increase the knowledge of the PCPs regarding the ADA clinical practice guidelines following an educational intervention and to assess compliance of use of the guidelines among providers. Specifically, each provider took a prereview test (Appendix B) to determine the level of baseline knowledge, behavioral barriers, and self-efficacy using the ADA clinical practice guidelines for A1C monitoring. Then, each provider viewed the Power Point presentation (Appendix A) to introduce the ADA clinical practice guidelines for A1C monitoring. After the review, the providers were asked to complete a posttest (Appendix B) to determine if an increase in knowledge has occurred.

Project Setting and Participants' Staff Education

The setting was an Appalachian rural clinic privately owned by a medical doctor in family practice in rural WV. The population and sample in the study included six medical doctors, two doctors of osteopathic medicine, 13 master's level prepared FNPs, and 11 master's level prepared physician assistants (PA), for a total of 32 potential participants. Permission was granted to access the EHR of each PCP that agreed to

participate in the DNP project. As providers are hired, the head FNP will repeat the process and steps of the PDSA cycle, adding to the semiannual report.

The Health Insurance Portability and Accountability Act law states that all patient data are protected; therefore, no patient data will be divulged before, during, or after the DNP project concerning the adherence about the frequency of A1C testing and monitoring of the diabetic patients in the Appalachian rural clinic (U.S. Department of Health and Human Services, 2003).

Data Collection of Staff Education

In order to determine an increase in knowledge among the providers, each provider completed a pencil-paper pre- and post-test survey (Appendix B) with the use of a personalized identifier. The pre- and post-test surveys contained nine questions, with Questions 1 to 4 related to knowledge of the ADA A1C National Guidelines. Questions 5 to 9 addressed PCP thoughts about the usefulness of following the ADA clinical practice guidelines in ordering. The pre- and post-test surveys were identical in nature, and no identifiable information was collected.

Data Analysis of Staff Education

Data from both the pre- and post-test surveys and from the retrospective chart review were entered into an Excel spreadsheet. The data from the pre- and post-test surveys were analyzed using descriptive and inferential statistics to determine if there was a difference in the number of questions answered correctly in the pre- and post-test surveys.

Budget and Timeline

The budget and financial analysis for improving provider A1C testing frequency adherence to the ADA clinical practice guidelines did not require many resources/ much funding to initiate the DNP project. The rural clinic owner covered the cost of resources for the pilot project. The potential PCP participants have already declined an honorarium.

For the proposed practice change to be effective and successful in the Appalachian rural clinic, there must be materials to present to the providers about A1C testing frequency and the guidelines, space for the meeting, paper to print off the education action plan booklet for the providers, use of a scanner and copier, and employee time. The staff in the rural clinic were provided lunch with an in-kind clinic donation from the owner on the provider informative training days. The direct cost for the DNP project ADA guideline on A1C frequency and testing training days for the providers totaled \$2,931.96.

The timeline for the DNP project was created to follow the progression of the DNP project from beginning to end. The prevention and control of DM is accomplished when the PCP adheres to the ADA clinical practice guidelines for the frequency of A1C testing, thus increasing the quality of life of the patient population. Success of the project depended on feedback from providers. The minimal startup cost of the project along with the funding assistance of the clinic administrator/owner equals saved lives and the cost to the target group.

Summary

The DNP project is critical for sustainability as it studies one of the most profound diseases in our nation today. Designing and managing problems of this magnitude are important not only for this underserved health population but for so many others who are still not identified or being served adequately (Smith, 2011). Monitoring of the A1C levels helps to reduce the incidence of health care costs and comorbidities in the Appalachian rural clinic patient population. The purpose of this project was the development of quality improvement use of ADA clinical practice guidelines with a focus on the frequency of A1C testing for the implementation by the provider. The practice change based on EBP can be successful in the rural clinic, particularly if active collaboration occurs with all parties involved working together in the direction of the same common goal.

IRB: 07-12-18-0408605

Section 4: Findings and Recommendations

Introduction

The purpose of this DNP project was to provide staff education and evaluate the measure of knowledge of the PCP in an Appalachian rural clinic located in WV. The DNP project topic and questions regarded the recommended ADA guidelines for A1C. PCP education was of importance for a smooth transition of change in a clinical practice setting among the PCP for health promotion and disease prevention of DM. A force of change, according to Lewin in 2011, was the driving force to improve the overall outcome of the patient mortality and morbidity in an Appalachian rural clinic in WV by educating the PCP on the ADA guidelines for A1C monitoring and testing. The DNP objective for the staff education was to increase the knowledge of the ADA guidelines for A1C monitoring and testing among PCP.

Optimal outcomes of quality care in the DM patient require the timely testing of A1C to prevent poor diabetic management or control. The patient with poor or uncontrolled DM is at an increased risk for organ damage. DM patients are at a greater risk, leading to glaucoma, neuropathy pain, peripheral amputations, and nonhealing wounds. Following the ADA guidelines, routine monitoring of glycemic control using A1C by providers in clinic practice is often not completed during routine office visits (Egbunike & Gerard, 2013). Eighty percent of patients in the first year do not have testing for A1C measurements (Egbunike & Gerard, 2013). Therefore, the patient population can be impacted by PCP's use of the tools provided for achieving goals that

addressed an increase in their knowledge of the ADA guidelines or frequency of A1C monitoring and testing.

Tools used for educating the PCP were a self-developed Power Point presentation on the importance of obtaining the A1C and a pre/post survey. A presurvey and postsurvey with the participating providers determined the level of baseline knowledge, behavioral barriers, and self-efficacy using the ADA guidelines for A1C monitoring. The pre- and post- survey asked nine questions identical in nature; Questions 1 to 4 related to knowledge of the ADA guidelines, and Questions 5 to 9 examined the PCP's thoughts about the usefulness of the clinical ADA guidelines. The rating scale for Questions 1 to 9 included *highly disagree*, *somewhat disagree*, *neither agree nor disagree*, *somewhat agree*, and *highly agree*.

Each PCP participant took a presurvey to determine the baseline level of knowledge using the ADA guidelines for A1C monitoring and testing. The PCP then viewed the A1C education component of A1C according to the ADA practice guidelines and then was given the opportunity to ask questions to make sure the goals were understood. Lastly, at the conclusion of the Power Point, each PCP completed the postsurvey, determining if there was an increase in PCP awareness and understanding of the ADA guidelines for A1C testing.

Discussion of Findings

Demographics

The PCP participants in the Appalachian rural clinic comprised of medical doctors, doctors of osteopathic medicine, physician assistants, and FNPs, for a total of 32

potential sample pool PCP participants. Out of the 32 volunteers to participate in the DNP project, a total of 12 pre/post surveys were completed and returned. The total PCP completion rate was 38%.

A review of the surveys, pre/post survey Questions 1 to 4 pertained to the knowledge of the ADA guidelines A1C testing frequency; Questions 5 to 9 indicated the PCP attitude about using the guidelines. For Question 1, 92% of the PCP participants presurvey answered the rating of *highly agree* with being familiar with the ADA guidelines pertaining to the frequency of A1C monitoring and testing in the patients with diabetes; however, in the postsurvey, they answered 100% *highly agree* on the same question. For Question 2, 67% of the PCP participants answered *highly agree* on the presurvey for offering safe, effective, quality care; on the postsurvey of that same question, there was a rating of 100% *highly agree*.

In the last question of the pre/post surveys, each PCP was given the chance to identify and describe any barriers that existed in their clinical practice to measure A1C in the diabetic patients according to the ADA guidelines. The behaviors reported and identified that hindered their patients to have the A1C included the following:

1. Lack of provider or nursing knowledge of guidelines.
2. Distance the patient has to travel to be seen (rural setting).
3. Delayed lab results (requiring extra follow-up appointment for patient).
4. Patient's failure to keep appointment due to forgetfulness.
5. Bad weather or lack of transportation cause canceled appointments.
6. Patients losing their lab order after A1C is ordered (lab location barrier).

7. Patient is noncompliant or patient knows their A1C will be elevated.
8. Patient simply does not want to come to appointment because it might result in added medications or a change in lifestyle.

All of the 12 PCPs in the Appalachian rural clinic who responded and returned the post surveys for education and knowledge of A1C monitoring agreed that they are now more aware of their ordering and monitoring practices. Responses to the Appalachian rural clinic PCP presurvey is shown in Appendix C. PCP postsurvey results are found in Appendix D. Also, Appendix E: Pie chart for comparison of presurvey of total responses and Appendix F: Pie chart for comparison of postsurvey of total responses

Implications

Implications on Practice, Future Research, and Social Change

Evidence-based literature has confirmed that DM is a health problem for the patient population in the Appalachian region; therefore, PCP education is of significant importance. ADA guideline literature indicated that following the ADA guidelines in clinical practice for the frequency of A1C monitoring helped provide the PCP with knowledge needed for diabetic patients. Education and training need to be continued with new PCP hires for the success of future research. A potential positive social change is that the patient's quality of life can increase by decreasing mortality and morbidity of potential negative outcomes of multisystem complications that could occur as a result of having DM.

Limitations

The PCP education survey pre/post evaluations were limited due to less than expected PCP participation of postsurvey completion. The initial number of PCP volunteer participation in the Appalachian rural clinic in the education was 32. Various factors were reported that prevented a greater PCP participation, including previous obligations, meetings, illness, vacations, and other unreported unexpected events. A total of 20 PCPs attended the Power Point presentation; however, only 12 completed and returned the pre/post surveys.

Strengths

Data from the surveys obtained the PCP perceptions of the educational power point presentation on the A1C education component monitoring according to the ADA practicing clinical guidelines. All PCP answered the intent was to offer and provide effective, safe, and quality of care. The group of PCPs answered 100% on the post survey that they were familiar with the ADA guidelines concerning the frequency of A1C monitoring of DM. No PCP participants answered on either the pre and post survey as *highly disagree*. See Appendix G for the differences in presurvey and postsurvey responses and Appendix H for the pre-post survey trends.

The same number of people responded with *highly disagree* or *somewhat disagree* in the presurvey and in the postsurvey. There were nine fewer responses of *neither agree nor disagree* and 13 fewer responses of *somewhat agree* in the postsurvey than in the presurvey. There were 22 more responses of *highly agreed* with questions in the postsurvey than in the presurvey.

Summary

The DNP project and PCP education in the Appalachian rural clinic is for sustainability as it used one of the most profound diseases in the nation today for the study. PCP education on the monitoring of the A1C levels lead to help reduce comorbidities and mortality in the patient population. A presurvey, Power Point, and postsurvey was used as a tool in the data collection of 12 PCPs in the rural clinic.

Data from the surveys obtained the PCP perceptions of the educational power point presentation on the A1C education component monitoring according to the ADA practicing clinical guidelines. All PCP answered the intent was to offer and provide effective, safe, and quality of care. 100% answered on the postsurvey that they were familiar with the ADA guidelines concerning the frequency of A1C monitoring of DM. None of the PCP participants answered any question on either the pre or post survey as *highly disagree*.

Total results indicate an overall improvement in total responses, the *highly agree* PCP presurvey total responses from all the question was 48%, with an increase on the PCP post survey to 68%. PCP participation in the educational proponent for A1C monitoring and testing provided to be a beneficial outcome in the Appalachian rural clinic. The increase in PCP knowledge of ADA clinical practice guidelines for A1C monitoring can only lead to improved patient outcomes and quality of care.

Section 5: Dissemination Plan

Self-Analysis as a Scholar

The development of this DNP project has greatly increased my skills in implementing and developing a PCP education program using clinical scholarship and writing. The dream of obtaining a terminal doctorate degree has been a goal of mine during most of my nursing career, first as a registered nurse and now as a nurse practitioner, which has spanned over 20+ years. I will be able to reach my goal and dreams with the completion of this DNP project. The role of the DNP has increased my awareness and importance of research of patient problems daily in clinical practice, especially scholarly articles.

Self-Analysis as a Practitioner

This DNP project has helped me to gain increased skills and knowledge as a family nurse practitioner and educator. I have taught nursing in WV higher education in seat and online at private colleges, with plans to teach online nursing courses in the near future. I have several years of experience in family practice and now work in the specialty area of palliative care and chronic illness. Having a DNP degree leads to an augmented credibility to each of my roles in the future as an educator and currently in clinical practice.

Self-Analysis as Project Developer

During the course of the development of this DNP project and PCP education, I have become passionate about researching topics in clinical practice. The topics include not only DM but other chronic illness as well, in the patients I care for daily. Working

many years in family practice and now in palliative care and chronic illness in the Appalachian region made me realize even more how important research can be. Along with research, completion of the DNP project and doctoral degree have made me aware of the significance of keeping the PCP informed through education. I feel more self-confident and comfortable in the area of research and look forward to studies yet to come. The development of the DNP project and PCP education have given me more awareness and objectivity as well as the bonus of achieving my nursing dreams and goal.

Summary

The evaluation of self as a scholar, practitioner, and project developer has been a timely and trying process, a journey I will not regret. During this process, I have grown in all the areas in the evaluation of self. In the area of scholar, there has been an increase in my skills in implementing and developing a PCP education program using clinical scholarship and writing. In the process of all the years, my dream of obtaining a terminal doctorate degree is becoming reality. In the area of practitioner, the DNP project has helped me increase skills and knowledge as a family nurse practitioner and educator. As a DNP project developer, I am passionate about researching topics in clinical practice. Working many years in family practice and now in palliative care and chronic illness in the Appalachian region made me realize even more how important research can be. The DNP project and doctoral degree made me feel more self-confident and comfortable in the area of research, and I look forward to studies yet to come.

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Appendix A: A1C Education Component

Slide 1

A1C Education Component

Quality Improvement & PCP Monitoring of A1C according to the American
Diabetes Association Practice Guidelines

Susan Simmons MSN, FNP-C

Slide 2

A1C

The 2013 ADA Clinical Practice Guidelines for Medical Practice.

A1C monitoring and testing is considered to be “Gold Standard” in Diabetes
Mellitus management and care.

- Who?
- Why?
- When?

Slide 3

Who?

Why? When?

- Who? The 2013 ADA Practice Guidelines and Standards of Care advises all DM patients be screened using A1C for management and treatment.

- Why? Research and EBP determined that strict glucose control lessened the risk of associated complications from DM in renal, cardiovascular, ophthalmologic, and neurological systems.
- When? According to the ADA Practice Guidelines recommend that A1C monitoring and testing be done every 6 months (semi-annually) for patients that are stable with values < 7; every 4 months (quarterly) for patients A1C > 7; every 3 months after a change in treatment for assessment of effectiveness of changed and/or new treatment.

Slide 4

Who?

- General Patient Population – At risk for DM
- DM Type I & II Adult (18 – 65)

Slide 5

Why?

- Research study over a 10-year period performed by the NIH of over 1,440 participants in the study with Type I DM. The research study concluded that intensive glucose control decreases the risk of renal (50%), cardiovascular (57%), ophthalmologic (70%), and neurologic (60%) complications.
- Research study over a 20-year period (1977-1997) performed by the UK Prospective DM study by Oxford University of over 5,000 participants. The

research study concluded that intensive control over glucose decreases all microvascular diseases (24%); nonfatal CVA, MI (57%); Fatal MI (33%).

Slide 6

Why?

- ≥Patients with an elevation of A1C levels have an increased risk for opportunistic disease and infection.
- Keep in mind – if the A1C blood sugar $\geq 7\%$; the endothelial tissues of the renal, cardiovascular, ophthalmologic, and neurologic systems are under attack and higher risk for damage.

Slide 7

Why?

- A1C of 7% = 154 Daily Average Blood Sugar ranges (123-185) (ADA, 2010)
- A1C of 8% = 183 Daily Average Blood Sugar ranges (147-217) (ADA, 2010)
- A1C of 9% = 212 Daily Average Blood Sugar ranges (170-249) (ADA, 2010)

Slide 8

When?

- PCP additional reasons to order A1C in the patient with DM
 - Non-Healing Wound
 - Vision Changes

- Fungal Infections (Candida)
- Signs/Symptoms of Neuropathy
- Recurrent UTI's
- Recurrent Sinusitis
- Elevated BP
- Fracture
 - Skin Infection (styes, boils, carbuncles, folliculitis, and, paronychia)

Slide 9

What?

- What does this suggest for the patients?
 - End clinical inertia by having a current A1C
 - PCP recognize there is a problem with clinical inertia (failure to act)
 - PCP deliberately show a different behavior from the clinical inertia when unsure of their treatment options/choices, or does not know when a changed treatment is required and/or needed, or when questioning patient adherence to the recommended treatment options.

Slide 10

Ending Clinical Inertia

- Keep in Mind
 - Remember:
 - If the patients A1C is 7% = 154 Daily Average Blood Sugar ranges 123-185.
 - If the patients A1C is 8% = 183 Daily Average Blood Sugar ranges 147-217.
 - If the patients A1C is 9% = 212 Daily Average Blood Sugar ranges 170-249.

Slide 11

A1C Tip Sheet

- Patients with DM comes into the rural clinic
- Is there an up to date or current A1C in the electronic health record?
- If no current A1C, order and A1C.
- If the patient A1C results is < 7%; order another A1C in 6 months.
- If the patient A1C result is more than 7%; adjust DM regimen, then re-order in 3 months.
- If yes, and is <7%; the patient is therapeutic, re-order another A1C in 6 months.

Slide 12

Any Questions?

Thank you for being a participant!

Slide 13

Reference

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Appendix B: Pre/Post ADA Guideline (A1C) Study Test

Question 1- 9	Highly Disagree 1	Somewhat Disagree 2	Neither Agree, Nor Disagree 3	Somewhat Agree 4	Highly Agree 5
1. I am familiar with the American Diabetes Association (ADA) guidelines concerning the frequency of A1C testing in diabetes mellitus (DM) treatment and management.					
2. I personally offer safe, effective, and quality care.					
3. I personally like to use national clinical practice ADA guidelines to make treatment decisions.					
4. I personally believe the clinical practice ADA national guidelines are helpful when making treatment plans.					
5. I agree that having a current A1C is helpful in the development for					

treatment decisions making for my DM patient population.					
6. I feel it is important to know a DM patient's A1C when I make treatment options.					
7. I feel in the future, utilizing a current A1C will be an integral part of my clinical treatment decisions.					
8. I follow the guidelines for frequency of assessing the A1C in patients with "unstable" DM? (A1C \geq 7%)					
9. I follow the frequency of assessing the A1C in patients with stable DM? (A1C \leq 6.9)					
10. Describe any barriers that may exist in your clinical practice to measure A1C for your Type II DM patients.					

Appendix C: Primary Care Provider Pretest Survey Results

Question	Highly Disagree	Somewhat Disagree	Neither Agree Nor Disagree	Somewhat Agree	Highly Agree
1.			1		11
2.				2	10
3.			2	4	6
4.			1	7	4
5.			1	5	6
6.			1	4	7
7.				8	4
8.			4	5	3
		2	3	6	1
<p>10. Please use the space below to answer this question: Describe any difficulties that occurred in your clinical practice to measure A1C for your DM Type 2 patients. Example: PCP non-adherence to guidelines is due to a cognitive difference of awareness, agreement, and adoption</p> <ul style="list-style-type: none"> - Distance the patient has to travel to be seen (rural setting) - Delayed lab results (requiring extra follow-up appointment for patient) 					

- Lack of provider or nursing staff knowledge of guidelines
- Patient fails to keep appointment due to forgetfulness
- Bad weather or lack of transportation cause cancelled appointments
- Patients losing their lab order after A1C is ordered (lab location barrier)
- Patient simply doesn't want to have blood drawn.

Appendix D: Primary Care Provider Posttest Survey Results

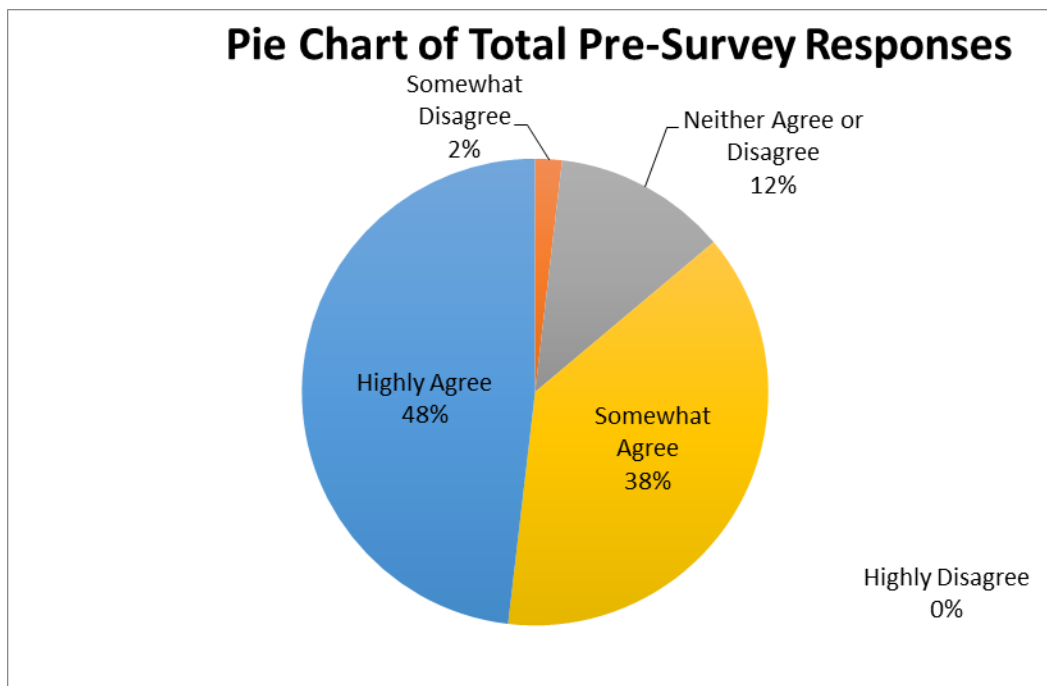
Question	Highly Disagree	Somewhat Disagree	Neither Agree Nor Disagree	Somewhat Agree	Highly Agree
1.					12
2.					12
3.				4	8
4.				3	9
5.				2	10
6.			1	3	8
7.				4	8
8.			1	6	5
9		2	2	6	2
<p>10. Please use the space below to answer this question: Describe any difficulties that occurred in your clinical practice to measure A1C for your DM Type 2 patients. Example: PCP non-adherence to guidelines is due to a cognitive difference of awareness, agreement, and adoption</p> <ul style="list-style-type: none"> - Distance the patient has to travel to be seen (rural setting) - Delayed lab results (requiring extra follow-up appointment for 					

patient)

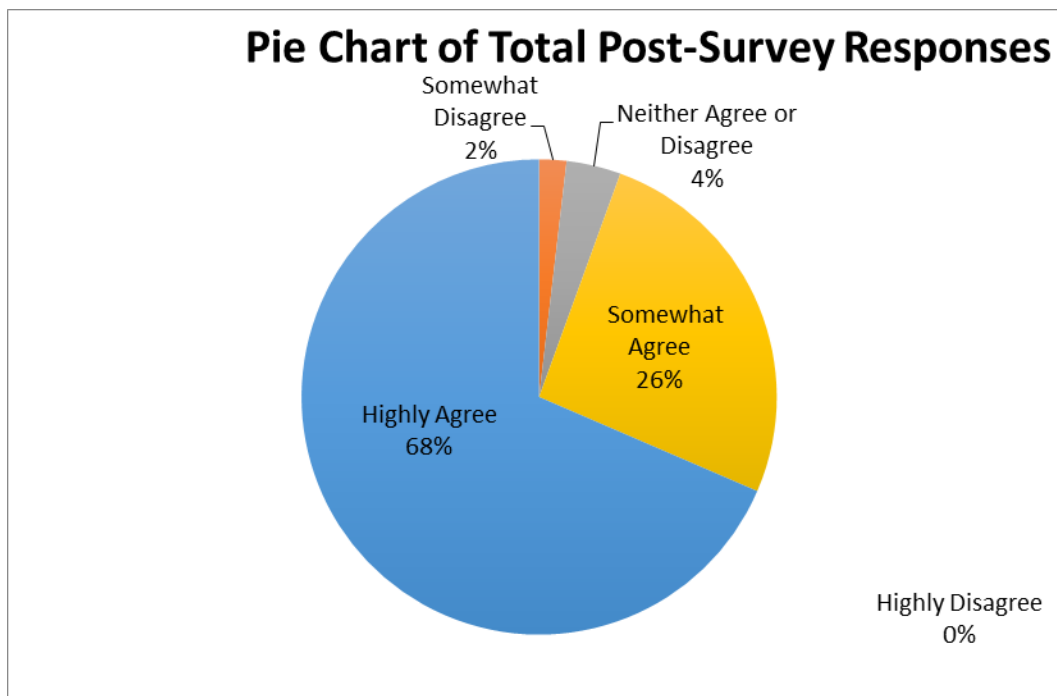
- Patient fails to keep appointment due to forgetfulness
- Bad weather or lack of transportation cause cancelled appointments
- Patients losing their lab order after A1C is ordered (lab location

barrier)

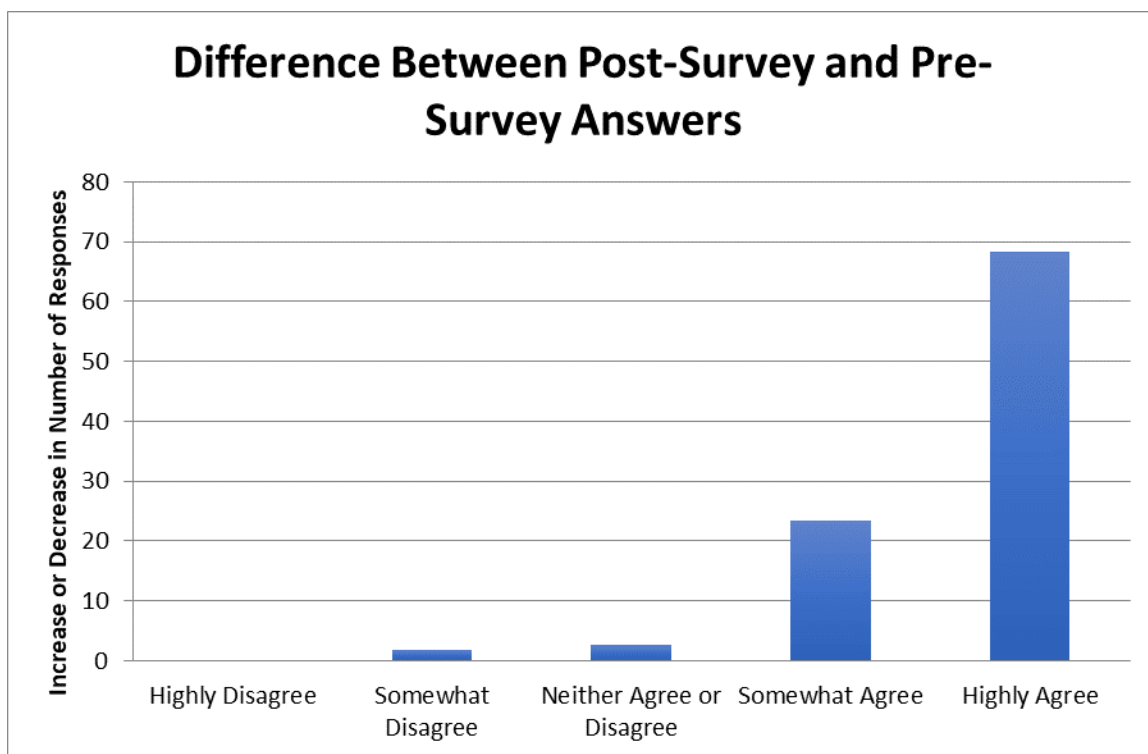
- Patient is non-compliant or patient knows that A1C will be elevated
- Patient simply doesn't want to have blood drawn.
- Patient doesn't want to come to appointment because it might result in added medications or a change in their lifestyle.

Appendix E: Pie Chart for Comparison of Presurvey of Total Responses

Pie Chart for Comparison of Presurvey of Total Responses

Appendix F: Pie Chart for Comparison of Postsurvey of Total Responses

Pie Chart for Comparison of Postsurvey of Total Responses

Appendix G: Difference in Presurvey and Postsurvey Responses

Appendix H: Pre/Post PCP Survey Trends Indicate an Improvement Post Survey