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Clustering Diabetes Appointments and Education

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CLUSTERING DIABETES APPOINTMENTS AND EDUCATION

A Scholarly Project

Presented to the

Faculty of Liberty University

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Nursing Practice

By

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Abstract

Diabetes impacts the lives of millions of Americans, and the number is growing rapidly every year. Diabetes education has been demonstrated to have a positive impact of the self-management of this chronic disease and effective in the reduction of A1C, weight, and blood pressure. Barriers to attendance at both diabetes education classes and provider appointments are varied with lack of transportation and available time cited as two of the many reasons, especially in the rural and medically underserved regions of the country. The project assessed a process improvement intervention clustering diabetes education with provider appointments to increase attendance and decrease A1C, weight, and systolic blood pressure. The project, while not demonstrating statistical significance in the reduction of A1C, weight, and systolic blood pressure, resulted in a marked increase in appointment attendance and both patient and provider satisfaction with the model.

Keywords: Diabetes, A1C, process improvement, patient satisfaction.

CLUSTERING DIABETES APPOINTMENTS AND EDUCATION

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Clustering Diabetes Appointments and Education

Type 2 diabetes mellitus (T2DM) is a chronic disease impacting the lives of more than 29 million individuals in the United States (American Diabetes Association [ADA], 2016). It is estimated that by 2020, over half of the United States population will have diabetes or metabolic syndrome, potentially leading to diabetes (Mehta, Santiago-Torres, Wisely, Hartmann, & Makadia, 2016). With the prevalence of diabetes rising, it is not surprising that healthcare costs associated with diabetes have increased to over \$245 billion annually (Harris, Kirsh, & Higgins, 2016). Diabetes is a financial burden to both urban and rural residents, though often rural and underinsured individuals have the additional burden of difficulty locating care providers to assist in managing their disease (Grant & Steadman, 2016).

Studies suggest that attendance at and participation in diabetes education classes along with education at provider appointments increase patient engagement and self-management activities (Brown, Winter, Silva, Brown, & Hanis, 2011; Safford, Andrae, Cherrington, Martin, & Halanych, 2015). Diabetes education classes have been shown to improve patient outcomes associated with the disease, specifically in regard to glycated hemoglobin (HbA1C), systolic blood pressure, and weight (Norris, Lau, Smith, Schmid, & Engelgau, 2002; North & Palmer, 2015). Unfortunately, for individuals living in rural areas, diabetes education classes are often difficult to attend due to lack of private and public transportation (Grant & Steadman, 2016; Schwennesen, Henriksen, & Willaing, 2015). Other reported reasons for nonattendance include geographical challenges such as travel distance to appointments and fewer available healthcare providers, leading to decreased access (Grant, 2016). Patient attendance at diabetes education classes and routine provider appointments may be improved when diabetes classes are scheduled with routinely scheduled primary care provider appointments. Subsequently, increased

attendance is projected to result in improved A1C, weight, and systolic blood pressure (Kaur, 2014). This practice improvement project aims to increase attendance by clustering provider appointments and diabetes education classes.

Background and Significance

According to the Centers for Disease Control and Prevention (CDC), diabetes is the seventh-leading cause of death in the United States and is responsible for significant disabilities in nearly every organ system in the body (2016b). Stroke, reduced renal function, peripheral vascular disease, blindness, and neuropathies are all common complications of poorly controlled diabetes (Nutti, Turkan, Lawley, Zhang, & Sands, 2015). It is estimated that 90–95% of all diabetes cases are classified as type 2 (CDC, 2016b). Patients with type 2 diabetes are twice as likely as those without to have heart disease and strokes, and they incur three times the healthcare costs as compared with patients without diabetes (CDC, 2016b; Garfield & Damico, 2012).

Many individuals with diabetes have knowledge deficits related to self-management of their disease (Hill-Briggs, Lazo, Peyrot, Doswell, & Chang, 2011). Low health literacy and lack of education are common barriers to self-care management (Grant & Steadman, 2016). Diabetes education classes both in a group and individual format, along with primary care provider appointments, have demonstrated an increase in patient self-care management and improved A1C and weight (ADA, 2016; Schmitt, Gahr, Hermanns, Kulzer, & Huber, 2013). While diabetes education classes have demonstrated improvement in patient diabetes self-care management, patient attendance at diabetes education classes is low (Kaur, 2014).

In the rural population, several barriers exist that hinder the ability of patients with diabetes to gain better control of their disease and comorbidities (Grant & Steadman, 2016;

Massey, Appel, Buchanan, & Cherrington, 2011). Lack of transportation has been reported as a major contributor to missed appointments both with providers and at diabetes education classes (Nuti et al., 2015; Salameh, Olsen, & Howard, 2012). Several randomized controlled studies have demonstrated that the clustering of appointments, coordinated scheduling of primary care provider and diabetes education classes, within a chronic care clinic setting can lead to a reduction in A1C, total cholesterol, and the unnecessary use of specialty and emergency care services (Edelman, Gierisch, McDuffie, Oddone, & Williams, 2013; Harris et al., 2016; Weinger, 2003). Based upon the current evidence, the implementation of a practice improvement project designed to cluster patient appointments with diabetes education classes will decrease barriers to attendance at diabetes education and provider appointments, improve patient self-care management, improve health outcomes, and decrease A1C in adults with type 2 diabetes (Edelman et al., 2013; Everest et al., 2016; Hwee, Cauch-Dudek, Victor, Ng, & Shah, 2014).

Problem Statement

Patients with diabetes who live in rural, underserved areas encounter unique barriers to attending provider appointments and diabetes education classes. Clustering of provider appointments with diabetes education has been demonstrated to improve patient outcomes. The current patient absentee rate for diabetes classes in a rural, underserved, federally funded health clinic is 19% and 17% for provider appointments.

Statement of Purpose

The purpose of this project was to implement a process-improvement intervention, specifically, clustering routine diabetes primary care appointments with diabetes education classes, aimed to increase patient attendance at diabetes education classes and provider appointments.

Clinical Question

In adult patients with diabetes who receive diabetes care at a rural primary care clinic located in an underserved community, does the clustering of diabetes education classes with routinely scheduled primary care appointments improve patient attendance?

Population

The population of interest for this practice improvement initiative was adult patients with type 2 diabetes in southern Virginia region. This area is considered a rural underserved community and is part of the Federally Qualified Health Center (FQHC) network.

Intervention

The intervention was the clustering of diabetes education classes with primary care provider appointments for routine management of diabetes.

Comparison

The comparison was between pre-intervention and post-intervention A1C, systolic blood pressure, and weight, and post-intervention provider and patient satisfaction surveys.

Outcome

The outcomes of interest were patient attendance at provider appointments and diabetes education classes, A1C, systolic blood pressure, and weight.

Literature Review and Synthesis

An extensive electronic review of the literature was performed including the following databases: CINAHL, Cochrane Library, PubMed, and Ovid. The last search for relevant studies was performed on September 20, 2016. Keywords used for searches included: diabetes, type 2 diabetes mellitus, rural health, clustered appointments, A1C, underserved, and underinsured.

Only journal articles from peer-reviewed sources published in the last five years were considered for review.

Analysis of the Literature

Impact of diabetes education. There is significant evidence supporting the positive impact diabetes education has on individuals with diabetes, though the amount of education and time required has yet to be established (Edelman et al., 2013). The ADA and the American Association of Diabetes Educators (AADE) released a position statement supporting the efficacy and importance of diabetes education in the maintenance of health and self-management in individuals with diabetes (Powers et al., 2015). Additionally, diabetes education should be tailored to the patient's level of education and cultural needs in order to achieve the greatest results (Harris, Graue, Dunning, & Haltbakk, 2015). When patients are empowered to be active participants in their own education and plans of care, they are more apt to maintain the healthy lifestyle changes planned. Hill-Briggs et al. (2011) found that by empowering low-income and financially depressed patients with diabetes to be active participants in their own plans of care, barriers to self-care could be lessened.

The AADE core curriculum was used to create a three-month intensive pilot intervention trial demonstrating that individualized, literacy-adapted self-management training decreased A1C, systolic and diastolic blood pressure, and total cholesterol in lower socioeconomic type 2 diabetics (Hill-Briggs et al., 2011). Incorporating evidence-based diabetes education curriculum into a program tailored to fit each patient or group of patients has been found to have a positive impact on A1C (Yarahmadi, Zare-Farashbandi, Nouri, & Hassanzadeh, 2014).

With self-care/self-management by the patient constituting 95% of all diabetes care, it is essential that healthcare providers educate both patients and their families in ways to care for

themselves and their diabetes (Funnell & Anderson, 2000; Kaur, 2014). Cathron, Johnson, Hubbart, Strickland, and Nance (2010) evaluated the impact of caregiving on self-care behaviors and appointment attendance in African American women with diabetes acting as caregivers for their children, grandchildren, or parents. Findings revealed that African American women who are primary caregivers neglect self-care and diabetes self-management to care for their loved ones as shown by behaviors including poor eating habits, lack of exercise and weight control, failing to take medication as prescribed, and trouble keeping provider and specialty appointments (Cathron et al., 2010).

Barriers to care for the rural population. Individuals with type 2 diabetes who live in rural regions have unique barriers to self-care management. With over one fourth of America's population living in areas designated as rural by the United States Department of Agriculture, it is imperative that barriers rural patients face are addressed by healthcare providers and diabetes educators (Grant & Steadman, 2016). Research suggests that brief office visits and limited primary and specialty providers are some of the reasons rural patients self-report barriers to self-care (Grant, 2016). With an estimated average of 5.2 minutes spent with a health care provider and inadequate collaboration between providers, dietitians, and diabetes educators, patients with diabetes have limited opportunity to become competent at self-care (Grant, 2016).

In a study conducted in the rural and medically underserved Appalachian region of the United States, lack of fuel was listed as a barrier to attendance at diabetes education 40 percent of the time, with time commitment the next greatest barrier (Jessee & Rutledge, 2012). Findings from this study were improved A1C and weight as self-management skills and diabetes knowledge in the group class model (Jesse, 2012).

Lepard, Joseph, Agne, and Cherrington (2015) performed a systematic literature review to determine the impact of self-management barriers in rural communities on patients' A1C and glycemic control. Varying lengths of diabetes education interventions and both in-person and telehealth models were studied, all with similar results. The results reinforced the need for quality diabetes education and self-care/self-management training, as well the benefits of telehealth in the management of diabetes in the rural population (Lepard et al., 2015). Other studies have reinforced the benefit of diabetes education tailored to specific patient cultural or education needs to remove barriers to diabetes care and self-management skills (Lawless, Kanuch, Martin, & Kaiser, 2016; Mohebi, Azadbakht, Feizi, & Sharifirad, 2013). In the rural population, it is essential to identify barriers to diabetes self-management and tailor diabetes education to each individual.

Missed appointments. Missed appointments and nonattendance at diabetes education classes in the primary care setting ranges from 15 to 35% nationwide, resulting in complications for both the patient and the office (Salameh et al., 2012). Patient nonattendance at appointments is associated with poor diabetes self-management and elevated HbA1C (Yarahmadi et al., 2014). Missed appointments decrease the opportunity for patients to receive necessary medical management and self-management reinforcement.

Since nearly 90% of diabetes health complications and their resulting financial impact are due to poor diabetes management, it is essential that practice process improvements reduce the incidence of missed appointments (Salameh, 2012). Salameh et al. (2012) evaluated the impact of phone call and text reminders for upcoming appointments, as well as diabetes education at every appointment, and the impact on attendance on diabetic markers such as HbA1C. Initial outcomes at three months demonstrated a marked reduction in A1C and weight; however, the

second evaluation resulted in elevation of A1C and weight. The increase in weight and A1C during the second evaluation was attributed to the Thanksgiving and Christmas holidays, which occurred within the second three-month period of the trial (Salameh, 2012).

Shared and clustered appointments. The concept of group visits, or shared appointments, is not new, having actually begun in the late 1970s (Ridge, 2012). Group visits is one method for reducing the impact of missed provider appointments and increasing self-management skills. Two different methods for group appointments have been studied and include a group meeting, much like a class, lasting 90–120 minutes monthly, every two months, or quarterly (Ruddock, Poindexter, & Gary-Webb, 2016). The more common type of group appointment involves a group visit consisting of diabetes education and self-management training and reinforcement, as well as a one-on-one appointment with a primary care provider either before or after the group visit (Jones, Kaewluang, & Lekhak, 2014; Hwee et al., 2014; Ridge, 2012). These studies, while obtaining mixed results, overall demonstrated improvement in patient-provider satisfaction, an increase in self-management, and a decrease in HbA1C. Additional benefits obtained from all of the studies resulted in a decrease in emergency room visits and a decrease in overall cost to the patient (Jones et al., 2014).

Everest et al. (2016) compared shared medical appointments to traditional office visits in the type 1 diabetic. While this study consisted of patients with juvenile diabetes type 1 and did not have a statistically significant impact on the participants' HbA1C, the benefits achieved through peer support and increased self-care are relevant (Everest et al., 2016). Another study involving multiple medical centers demonstrated that group self-management training resulted in a decrease in complications related to hypoglycemia, infections, and emergency room visits, as well as a decrease in biometrics such as HbA1C and lipids (Edelman et al., 2014). A strength of

this study is its ability to be generalized to the greater population, as it was conducted as a multicenter trial instead of being localized at one center. Studies such as these reinforce the use of shared medical appointments as an innovative, cost-saving tool that can be used in the rural underserved population with diabetes to decrease barriers to self-care and self-management and decrease HbA1C.

Conceptual and Theoretical Framework

Theory of Self-Care and Self-Care Deficit

This practice improvement project involved the clustering of provider appointments with diabetes education classes to increase attendance and decrease A1C, systolic blood pressure, and weight. The theoretical framework for this practice improvement project incorporated Dorothea Orem's Theory of Self-Care and Theory of Self-Care Deficit. The Theory of Self-Care Deficit is one of three nursing theories by Dorothea Orem and has six major assumptions:

- People should be self-reliant, and responsible for their care, as well as others in their family who need care.
- People are distinct individuals.
- Nursing is a form of action. It is an interaction between two or more people.
- Successfully meeting universal and development self-care requisites is an important component of primary care prevention and ill health.
- A person's knowledge of potential health problems is needed for promoting self-care behaviors.
- Self-care and dependent care are behaviors learned within a socio-cultural context. ("Self Care Deficit Theory," n.d., para. 2)

These assumptions, in conjunction with the knowledge that the majority of management of diabetes is self-care and self-management, made Orem's Self-Care Deficit Theory a fitting theoretical framework for this practice improvement initiative. Self-care deficits occur when knowledge deficits exist either from lack of understanding of a disease process and its necessary treatment or when an individual is incapable or unmotivated to engage in self-care activities. Often, individuals with diabetes have self-deficits in several areas of self-care, from complying with prescribed medication regimens to knowledge of dietary modifications (Grant & Steadman, 2016). Diabetes education both in classes and at provider appointments increases patients' self-care knowledge, enabling individuals to take control of their health and decrease diabetes-related complications (Lepard et al., 2015).

Orem's theory provides a framework for this project by guiding the assessment of the self-care deficits of individuals with diabetes and the intervention in the reduction of those deficits. "The term self-care means care that is performed by oneself for oneself when one has reached a state of maturity that is enabling for consistent, controlled, effective, and purposeful action" (O'Shaughnessy, 2014, p. 495). The beauty of a theory such as Orem's is the ease in applicability that many other theories do not have. It is essential patients are knowledgeable about their disease and self-care practices are reinforced, as over 95% of diabetes management is patient self-care (Mohebi et al., 2013). With so much of diabetes care consisting of self-care, Orem's Theory of Self-Care and Self-Care Deficit is a theory that is a steel girder to this scholarly project.

Plan-Do-Study-Act

The Plan-Do-Study-Act (PDSA) is a widely accepted process improvement tool and is used often in healthcare for its success in quality improvement initiatives (Taylor, McNicholas,

Nicolay, Darzi, & Bell, 2013). The PDSA model is often a series of small Plan-Do-Study-Act cycles leading to an end product of change. The first step of the PDSA model is the planning stage. In this stage, a literature review was performed, site and sample population selected and authorizations obtained, proposal review written, and IRB authorization obtained.

During the second stage, the “Do” stage, the practice improvement project was performed. The “Study” stage, or third stage, involved the evaluation of the data obtained during the project “Do” stage. The next step, the “Act” stage, involved the adoption of the practice change, or back to stage one with the planning process to make changes to improve the project (Gaglio & Glasgow, 2012). During this stage, the information gathered during the project was disseminated to the stakeholders as well as submitted for publication.

While the PDSA method was used to complete this process improvement project it actually consisted of several smaller PDSA cycles, which were used throughout the project period. Small PDSA cycles were completed to establish the best method for clustering provider appointments with diabetes education allowing for the most efficient flow for patients within the schedule. Further small cycles were completed with the front office staff to schedule patients and ensure availability of interpreters for the three participants who speak Spanish.

Methodology

Project Description

This practice improvement project was performed at a Federally Qualified Health Center (FQHC) in southern Virginia, utilizing PDSA for the conceptual framework (W. Edwards Deming Institute, n.d.). The practice maintains office visits from 7 a.m. to 7 p.m. Monday through Friday, as well as night and weekend providers on call, with the goal of increasing healthcare access to the population it serves. While the practice currently has an established

diabetes education schedule for both group and individual classes, patients are usually not scheduled for both class and primary care provider appointments in the same day. The current patient absentee rate for diabetes education classes at the practice is 19% and 17% for provider appointments; both are within the national norm range of 15–35% (Salameh et al., 2012). This practice change was designed to cluster provider appointments and diabetes education classes and was aimed at increasing attendance at diabetes education classes.

The purpose of this scholarly project was to initiate a practice improvement process aimed at improving attendance to provider appointments and diabetes education classes, patient biometrics, and patient satisfaction. The objectives for this practice initiative were to implement a practice change to increase attendance at both provider appointments and diabetes education classes by clustering those appointments on the same day of service. The practice currently provides diabetes education classes, though it is not standard practice to coordinate diabetes education classes with provider appointments.

Project Objectives

1. There will be an improvement in patient attendance of diabetes education and provider appointments.
2. There will be a reduction in HbA1C, systolic blood pressure, and weight post-intervention.
3. Patients will have improved satisfaction with the clustered appointment model.
4. Providers will have improved satisfaction with the clustered appointment model.

Process Change Protocol

The practice improvement change involved the scheduling of patients who met inclusion criteria with the diabetes educator on the same day as their regularly scheduled primary care

appointment for management of diabetes. The diabetes educator appointment was scheduled either prior to or following the primary care provider appointment.

Population

Primary population. The primary population consisted of the nurse practitioners and diabetes educator within the practice setting. The front office staff involved with the scheduling of appointments, as well as the Spanish-language interpreters, were included in the primary population for this practice improvement project.

Secondary population. The secondary population consisted of adults with T2DM from the practice who were assigned to the patient panel of a family nurse practitioner in the practice. Patients on these panels have established diagnoses of T2DM. The sample was gathered using a nonrandom convenience sampling method, as the patients were existing patients of the practice. Inclusion criteria consisted of the following: (a) a primary diagnosis of type 2 diabetes mellitus, (b) HbA1C of 7.5% or greater, (c) Age > 18, and (d) an active patient in the practice of a study FNP. Exclusion criteria included patients newly diagnosed with type 2 diabetes, patients with HbA1C less than 7.5%, type 1 diabetics, individuals with gestational diabetes, and any individual < 18 years old or > 90 years old. Both English speaking and Spanish speaking individuals were included within the sample population. The practice employees Spanish-speaking front office staff to assist both providers and the diabetes educator with patient encounters for Spanish-speaking patients. These employees were used to assist with translation at the provider, diabetes education, and to assist with interpretation and questions for the consents and questionnaires.

Ethical Considerations

The project leader and committee have completed the Collaborative Institutional Training Initiative (Appendix B). The final committee-approved project protocol was submitted to

Institutional Review Board (IRB) at the institution of record, and was approved to progress (Appendix C). The purpose of this project was performance improvement in scheduling and evaluated outcomes using de-identified patient data in a password-protected PDF. Specific patient consent was necessary prior to the patients completing the satisfaction survey.

Consent was required though both regular follow-up appointments for management of diabetes and diabetes education were established practices at the project site. Each patient was assigned a number at the time of his or her office visit, which was used throughout the project in lieu of patient identifiers. Patient identification numbers were maintained in a password-secured file separate from data collected during the project.

Setting

The practice site is a member of a community Coalition for Health and Wellness, provides services for residents of the surrounding cities in central Virginia. The project site is a Federally Qualified Health Center (FQHC), providing care for the underinsured and the uninsured. FQHCs are found nationwide in both rural and urban areas and provide primary care and preventative healthcare services to the medically underserved and are eligible to receive funding grants under Section 330 of the Public Health Service Act. In addition to being a FQHC primary care center, the project site also participates in local community initiatives to provide medication assistance, care coordination for chronic diseases, weight management, and exercise classes for area residents. The clinic records 14,500 patient appointments annually, serving over 4400 patients, with 16% Medicaid, 31% Medicare, and 36% of the practice population being uninsured or underinsured and utilizing the sliding scale for payment.

Stakeholders

The key stakeholders for this project were those individuals and groups having the ability to impact change through the implementation of the project and those benefitting from said change. The project site is governed by a board of directors with onsite administrative duties carried out by an onsite practice manager and clinical practice director. The clinical practice director is responsible for the creation and review of policies related to patient care, as well as having an assigned patient panel. In addition to the clinical practice director, the project site employs two primary care physicians, two family nurse practitioners, and a mental health nurse practitioner. Office staff, including registered nurses and licensed practical nurses, as well as several bilingual receptionists and schedulers, play a vital role in the communication between patients and their primary care providers. Other stakeholders impacted by the practice change were the patients and their families.

Congruence of Project with Mission of Organization

The project site, located in central Virginia, is a designated FQHC site that receives federal, state, and local funding for services they provide to the underinsured and underserved in southern Virginia. It is a primary practice setting that strives to provide comprehensive care to its patients to include a laboratory, mental health providers, a medication assistance program, and diabetes education classes. Like many rural areas of the country, in Henry County and surrounding counties, T2DM is prevalent (CDC, 2016a).

The mission of the project site is as follows:

The community Coalition of Health and Wellness is committed to providing medical and primary health services at project site and through a variety of other programs, to promote health, reduce health risk factors and to increase access to medical services,

primarily for the uninsured and underserved in the [REDACTED]

The vision of the project site is as follows:

The Coalition is a group of people who are working together to ensure a healthier future for our community. We operate a variety of programs in the areas of wellness, disease prevention, and health care access and coordination. We have programs to help uninsured people get medical care. We also help people get the medicines they need. Our free classes help people manage chronic illnesses. Directly and through our community partners, we encourage families and children to enjoy healthy activities and learn more about good nutrition. Community members can get health information, free tax help, Medicare Part D plan comparisons, and advice for seniors and their caregivers.

([REDACTED], 2005)

This project aligns with the mission and vision of the project site and the community coalition in that increasing access to health services such as diabetes education classes and reducing complications associated with diabetes related to poor self-management benefits the patients and the community.

Tools

A satisfaction survey was provided to both the patient and the provider to determine their satisfaction with the changes implemented during the practice improvement. A literature review was conducted within the Health and Psychosocial Instruments database for a self-report patient survey and provider survey measuring satisfaction of a process improvement change. A tool was not available for either the provider survey or patient survey; therefore, the project leader developed a four-item Likert-type questionnaire aimed at exploring patient and provider

satisfaction with the clustering of provider and diabetes education classes (Appendix A). The provider and patient satisfaction survey questionnaires were composed of four questions relating to satisfaction with scheduling of the day's appointments and whether the new schedule was likely to increase attendance.

Feasibility Analysis

A feasibility analysis for this practice improvement initiative included resources of personnel, technology, staffing, and budget and a cost-benefit analysis. The physical location for the project was an established practice setting, and the project had the approval and support of the practice and coalition directors (Appendix C). With the application of a cost-benefit analysis during and at the completion of the project, areas that were successful and unsuccessful were able to be identified (Moran, 2014). In order to complete a feasibility analysis, any resources and equipment necessary to complete the project such as a password-protected computer, Excel, SPSS, access to eClinical, the practice electronic medical record, and provider and patient satisfaction surveys.

Resources

The implementation of this practice initiative project required the assistance of key personnel, including the clinical director and diabetes educator of the project site, both of whom serve in the pivotal roles of scheduling and resource allocation. The clinical director and executive director for practice offered full support of this practice initiative project (Appendix D) and granted permission for the use of the practice facility and use of the electronic medical record.

Other resources necessary to the success of this practice improvement project included a password-secured computer equipped with Excel and SPSS for statistical analysis. eClinical, the

electronic medical record utilized by the project site, was accessed to obtain patient A1C, weight, and systolic blood pressure.

Project Timeline

The timeline for this project was divided into three phases: pre-intervention, intervention, and post-intervention. The pre-intervention phase of the project began the end of November 2016 with the scheduling of provider appointments and diabetes classes on the same day to begin January 1, 2017. The intervention phase of the project ran from January 1, 2017, until the middle of May 2017. Post-intervention data were collected at appointments scheduled in May 2017.

Preparation. Following the Plan-Do-Study-Act model for practice improvement, the planning stage of this project involved the identification of an area of practice improvement with the outcome of benefitting both the practice and the patients it serves. Stakeholders were engaged to garner support for the practice change after literature was reviewed to determine if evidence supported the practice change. Other activities that occurred during the planning stage of the project were:

- On November 10, 2016, the project was presented to the IRB of the institution of record.
- On November 21, 2016, work began with the front office staff and the diabetes educator to begin cluster scheduling for patients identified as meeting inclusion criteria.

Implementation. During the “Do” phase of the practice improvement project, the clustered appointments intervention was piloted in the practice setting. Activities within this phase of the project were:

- Beginning November 21, 2016, pre-intervention data were collected from the electronic medical record, and the patient database in Excel was established.

- Beginning January 5, 2017, patients began to be seen in the clustered appointment schedule, and baseline data were obtained at these visits.
- On May 15, 2017, post-intervention data were obtained from follow-up provider appointments.
- On May 16, 2017, post-intervention data analysis began.

Evaluation. The “Study” phase of the PDSA model evaluates and analyzes the data collected during the “Planning” and “Doing” stages to determine if the intervention was successful. Activities that occurred during the “Study” phase were:

- On May 16, 2017, post-intervention data analysis began.
- On March 17, 2017, post-intervention provider and patient survey analysis began.
- By July 17, 2017, project outcomes were complete and ready for dissemination to the practice.

Personnel

The personnel necessary for this practice improvement project were the key element to the success of the project. The front office staff was essential in the scheduling of each patient’s appointments with both the provider and the diabetes educator, a registered nurse. The nurse practitioner saw individuals identified as meeting inclusion criteria with follow-up by the diabetes educator. The involvement of the clinical director as well as the practice manager was essential in the success of the project.

Technology

All data collected during the practice improvement project were maintained on a password-protected computer on a secured PDF. The practice electronic medical record, eClinical, was used to collect data necessary for the comparison of pre- and post-intervention

assessments of participants' A1C, systolic blood pressure, and weight. Programs such as Excel and SPSS were used in the analysis of data.

Budget

The budget necessary for this practice improvement project was kept to a minimum, as current practice expectations are for adult patients with diabetes to have regularly scheduled appointments with their primary care provider and to have diabetes education. Costs associated with printing of surveys were estimated to be less than \$100. Incidental expenses occurred were accounted for on an as-needed basis.

Cost/Benefit

Costs associated with personnel resources constitute the largest portion of financial resources and are an existing expense within the practice. Given the number of adults with diabetes seen within the practice and the significance of reducing A1C to decrease complications of diabetes, along with project site's mission of providing quality care, the cost-benefit ratio was justifiable. The project site offered diabetes education classes to patients, as well as regularly scheduled diabetes follow-up appointments with providers. The potential benefit of diabetes education classes on the same day as provider appointments was an increase in attendance. With evidence supporting the effectiveness of diabetes education in reduction of A1C, the practice change was anticipated to lead to a decrease in A1C. If the project is determined to be a priority for project site, an outlined budget will require organizational justification.

Project Evaluation

Design and Methodology

Intervention. The intention of this practice improvement project was to assess the intervention of clustering routine diabetes management appointments with diabetes education

classes to improve attendance. The goal of this practice improvement project was to improve attendance at diabetes education classes and ultimately to improve the health outcomes of adults with diabetes in a central Virginia community. Outcome indicators established to assess the success of the intervention were the following:

1. There will be a fifty-percent increase in attendance at scheduled appointments for the sampled patient population.
2. Fifty percent of the patients will complete the Likert satisfaction survey.
3. All providers will complete the Likert satisfaction survey.
4. There will be a reduction in A1C for sampled patients.

This project was a process-improvement, which utilized a quasi-experimental, single-group pretest-posttest with a one-way repeated measure design and subjective patient satisfaction questionnaire. The intervention involved the clustering of primary care provider appointments with individual and small-group diabetes education classes. Spanish language interpreters were provided for the three Spanish-speaking patients. Pre-intervention data, including HbA1C, systolic blood pressure, and weight, were collected to establish baseline data on each patient participant and were recorded in the eClinical care plan. Attendance rates for previous diabetes classes both individual and small-group were obtained for the three months prior to the study. Then, all identifying patient data were removed, and each patient was assigned an identification number. Post-intervention data, including HbA1C, systolic blood pressure, and weight, were collected at the three-month follow-up appointment and documented within the practice's eClinical care plan as well as using the patient's assigned study identification number and logged in Excel.

Data Collection and Management. A nonrandom purposive sampling method was used to identify the sample population, as the defined group consisted of pre-existing patients with diabetes within the practice. Collection of data proceeded as following:

1. A pre-intervention chart audit was performed to identify adult patients meeting inclusion criteria and an A1C $> 7.5\%$. The list was narrowed by patients scheduled for regular quarterly follow-up during time of project, by provider, and by patients not receiving diabetes education off-site.
2. The project leader created two master lists in Excel: one consisting of patient medical record numbers and assigned patient identification numbers, and another with assigned patient identification numbers and data collected during the project. Both of these master lists were converted to a password-secured portable document format (PDF) file on a secured computer to remain in compliance with Health Information and Privacy Protection Act (HIPPA) guidelines. These records will remain secured for no less than three years after the completion of the project and will not be duplicated. After the minimum of three years, the password-protected files will be deleted from the secured computer according to the standards set by HIPAA guidelines at that time.
3. The project leader performed a retrospective chart review at the end of the project to obtain data for patients in the study, collecting current A1C, systolic blood pressure, and weight, as well as comparing pre- and post-intervention attendance rates.
4. The project leader provided the patients and nurse practitioners who participated in this project with a Likert-scale assessment of satisfaction with scheduling changes. This data were entered into the password-protected Excel spreadsheet. All patients were given a four-item post-intervention questionnaire (Appendix A) to rate their satisfaction with the

clustered medical appointments. The nurse practitioners were also asked to complete a provider satisfaction questionnaire (Appendix B) on the change in practice.

Statistical Analysis

The independent variable examined in this project was the impact of the intervention of clustered appointments on patient attendance rates, biometrics, and patient/provider satisfaction. Statistical analysis was performed using an ANOVA test on IBM's SPSS statistical analysis computer software. The ANOVA test evaluates the variability in a study, and by using a repeated measure design, controls for variability are increased (Clanton, 2014).

Action	Goal	Sampling and Statistical Measurement
Pre- and post-intervention data were collected: A1C, systolic blood pressure, weight	There will be a 1.5–2.0 point overall decrease in A1C for the sampled patients	Nonrandom purposive sampling Parametric: paired t-test
Provider completed post-intervention Likert Satisfaction Survey	75% of providers will complete the survey	Nonrandom convenience sample Descriptive analysis (median, mode, range)
Patient completed post-intervention Likert Satisfaction Survey	100% of participants will complete the survey	Nonrandom convenience sample Descriptive analysis (median, mode, range)
Patient attends diabetes education and provider appointments	Missed appointments will decrease by 5%	Nonrandom convenience sample Descriptive analysis (median, mode, range)

Figure 1.

Data Analysis: Objective 1. Increase in Attendance at Provider Appointments and Patient Attendance. Prior to the practice improvement project intervention, attendance to diabetes education was 81% and 83% for provider appointments. Attendance to the clustered

appointment model during the study period was 95% for the sample population. This increase in attendance to both provider and diabetes education allows for increased face-to-face interaction with patients, thus increasing the opportunity to have a positive impact on patient self-management of diabetes.

Object 2. Improvement in A1C, Systolic Blood Pressure, and Weight. A single group pretest-posttest design was implemented in an effort to reduce regression threat to validity (Sullivan, 2012). The objective was to ascertain the impact of clustering provider appointments and diabetes education classes on patient A1C, weight, and systolic blood pressure. A paired t-test was performed to analyze the parametric measurements obtained during the project. Statistical analysis of the data was completed using SPSS computer software by evaluating for statistically significant ($p > 0.05$) changes to the physiologic measurements of HbA1C, systolic blood pressure, and weight. By collecting prior appointment data and data at the time of the intervention appointment, a double pretest was created in an effort to reduce the regression threat to validity (Sullivan, 2012). The independent variable examined in this project was the impact of the intervention of clustered appointments on attendance, biometrics, and patient and provider satisfaction. SPSS statistical analysis computer software was used to run a paired t-test. The t-test evaluated the variability in a study, and by using a repeated measure design, controls for variability were increased (Clanton, 2014). The final sample size was small ($n = 29$), and therefore any conclusions made from the results obtained should be guarded. The analysis was completed, and there was no statistical significance found in pre-intervention and post-intervention biometrics including A1C, weight, and systolic blood pressure, though improvement was seen in many of the patients' specific metrics.

Table 1

Paired Sample Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1				
Pre A1C	9.679	24	2.1437	.4376
Post A1C	9.075	24	1.9751	.4032
Pair 2				
Pre WT	207.513	23	71.0878	14.8228
Post WT	218.643	23	61.2576	12.7731
Pair 3				
Pre SBP	128.33	24	14.980	3.058
Post SBP	131.38	24	16.167	3.300

Table 2

Paired Samples Correlations

	N	Correlation	Sig.
Pair 1			
Pre A1C & Post A1C	24	.632	.001
Pair 2			
Pre WT & Post WT	23	.567	.005
Pair 3			
Pre SBP & Post SBP	24	.645	.001

Table 3

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1								
Pre A1C - Post A1C	.6042	1.7741	.3621	-.1450	1.3533	1.668	23	.109
Pre WT - Post WT	-11.1304	62.1889	12.9673	-38.0229	15.7621	-.858	22	.400
Pre SBP - Post SBP	-3.042	13.163	2.687	-8.600	2.516	-1.132	23	.269

Data Analysis- Objective 3 and 4: Patient Satisfaction and Provider Satisfaction. An important component of this practice improvement project was the feedback from both the patients and the providers regarding the change in scheduling of appointments. Both patients and providers were given the opportunity to complete a short Likert scale while in the office to accumulate subjective data. The survey, while not previously tested for reliability or construct validity was tested for face validity prior to use. The subjective questionnaire results were analyzed using descriptive analysis. All patients ($n = 24$) agreed to complete the survey and were given the opportunity to answer the questions privately. The results returned showed the majority of the patients surveyed liked the format of the clustered appointments and would be more likely to attend diabetes education in the future if classes were scheduled of the same day as their provider appointment.

The range of answers for this question was 1–5, with 1 representing unsatisfied and 5 very satisfied. The median answer was 4.5, indicating patients were very satisfied with

the scheduling of the appointments. No patient was unsatisfied with the scheduling, and answers only were neutral (3) or better.

1. Scheduling of diabetes class on the same day as provider appointment? (Cluster appointments)

The range of answers for this question was 1–5, with 1 representing unsatisfied and 5 very satisfied. The median answer was 4.6, indicating patients were very satisfied with the scheduling of their diabetes education appointment. No patient was unsatisfied with the scheduling, and answers only were neutral (3) or better.

2. Clustered appointments if they are available in the future?

The range of answers for this question was 1–5, with 1 representing unsatisfied and 5 very satisfied. The median result for this question was lower at 3.79, with more patients answering neutral (3), no patient answering unlikely (1 or 2), and only one answering very likely (5).

3. Do you think clustered appointments would allow you to be more likely to attend diabetes education classes?

This question was a yes-or-no format and garnered 87.5% of the responses from patients expressing that they felt they would be more likely to attend education in the future if it was clustered with their provider appointment (21 = yes, 3 = no). The formatting of this question as a yes-no answer may have been confusing for many patients resulting in the lower response rate than resulted from the other questions.

Survey Question	Median Rating
Scheduling of today's appointment with the provider?	4.5 out of 5, equates very satisfied
Scheduling of diabetes education class on same day as provider appointments? (cluster appointments)	4.6 out of 5, equates very satisfied
Clustered appointments if they are available in the future?	3.79 out of 5, equates satisfied
Do you think clustered appointments would allow you to be more likely to attend diabetes education classes?	87.5% answered yes, positive

Figure 2.

Survey Question	Results
How satisfied are you with:	
a. Scheduling of today's appointments with the education class?	4.5 out of 5, very satisfied
b. Clustering of diabetes classes with today's appointments?	4.5 out of 5, very satisfied
Q2. How likely are your patients to:	
a. Feel this format of scheduling benefitted and increased their self-care abilities?	4.5 out of 5, very likely
b. Increase appointment attendance?	4.5 out of 5, very likely

Figure 3.

Limitations. Several limitations were identified during the implementation and evaluation of the project outcomes. One limitation was the time allowed for the intervention results to be evaluated. A1C is a value that is used as a tool to evaluate a patient's blood glucose over a three-month period and while this project obtained a pre- and post-intervention A1C only one A1C cycle was obtained. A longer study lasting twelve-months or more, providing multiple cycles, would provide a more accurate determination of the benefits discovered from clustered appointments.

Establishing trusting relationships is essential with any patient-provider relationship, which can often require multiple interactions. This project only allowed for the provider to have a minimum of two interactions with each of the participants, and while all of the patients were existing patients within the practice, this could be a potential limitation to the success of the clustered model. Further, by creating trusting relationships between the patient and the provider the patient not only will be more likely to attend appointments but will also be more likely to make changes to their lifestyle which decrease complications related to diabetes as well as take more likely to take their medicine as prescribed. Attendance to appointments within the clustered appointment model could also be contributed to the Hawthorne Effect where the patient participates when they normally would not, because they know they are participating in a study.

Dissemination

The results garnered from this practice improvement project will be presented within the clinical practice where this project was undertaken. A written outcomes report will be presented to the clinical director and the practice providers at a regularly scheduled providers meeting. An oral outcomes report, as well as a written report, will be presented to the Coalition Board of Directors, as deemed necessary by the Director of Operations, discussing the impact of the practice improvement project. Additionally, the findings will be presented in a PowerPoint presentation, along with a lecture, at a local university.

Practice Implications

The importance of diabetes education is well-supported in the literature, as well as its impact on A1C, weight, and diabetes self-management (ADA, 2016; Schmitt et al., 2013). The project site strives to provide quality care for their adult diabetic population both with regularly scheduled provider appointments and by offering frequent patient-centered diabetes education classes. This practice improvement project furthers the project site's mission by clustering provider appointments with diabetes education to improve ease of attendance for its rural, underserved population. While attendance increased at the clustered appointments from 83% and 81% to 95%, the small sample size of the project cannot be generalized for the remaining patients with diabetes in the practice. However, the improvement seen in the biometrics of many of the patients, though not statistically significant, may suggest that further clustered appointments could benefit patient outcomes. Additionally, the significant increase in attendance to appointments indicates the positive response by the patients to the practice improvement process change.



Conclusion

The intention of this practice improvement project was to provide patients with ways to increase diabetes education attendance and improve biometrics including A1C, weight, and systolic blood pressure. Specifically, by eliminating frequent visits for appointments, barriers to attendance were decreased. In the patient population of this practice setting, transportation and financial considerations must be taken in to account when scheduling patient appointments. While the results from the paired t-test completed on the patient biometrics did not show statistical improvement, specific patient results were found to be positive. Patient satisfaction with the format of the clustered appointments suggests that this format of scheduling would improve attendance in the future.

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Appendix A

Post-Intervention Patient Satisfaction Survey

Q1. How satisfied are you with: (Circle one answer each line)	Unsatisfied		Neutral	Very Satisfied	
a. Scheduling of today's appointment with the provider?	1	2	3	4	5
b. Scheduling of diabetes class on the same day as provider appointment? (Cluster appointments)	1	2	3	4	5
c. Clustered appointments if they are available in the future?	1	2	3	4	5
d. Do you think clustered appointments would allow you to be more likely to attend diabetes education classes?	yes	no			

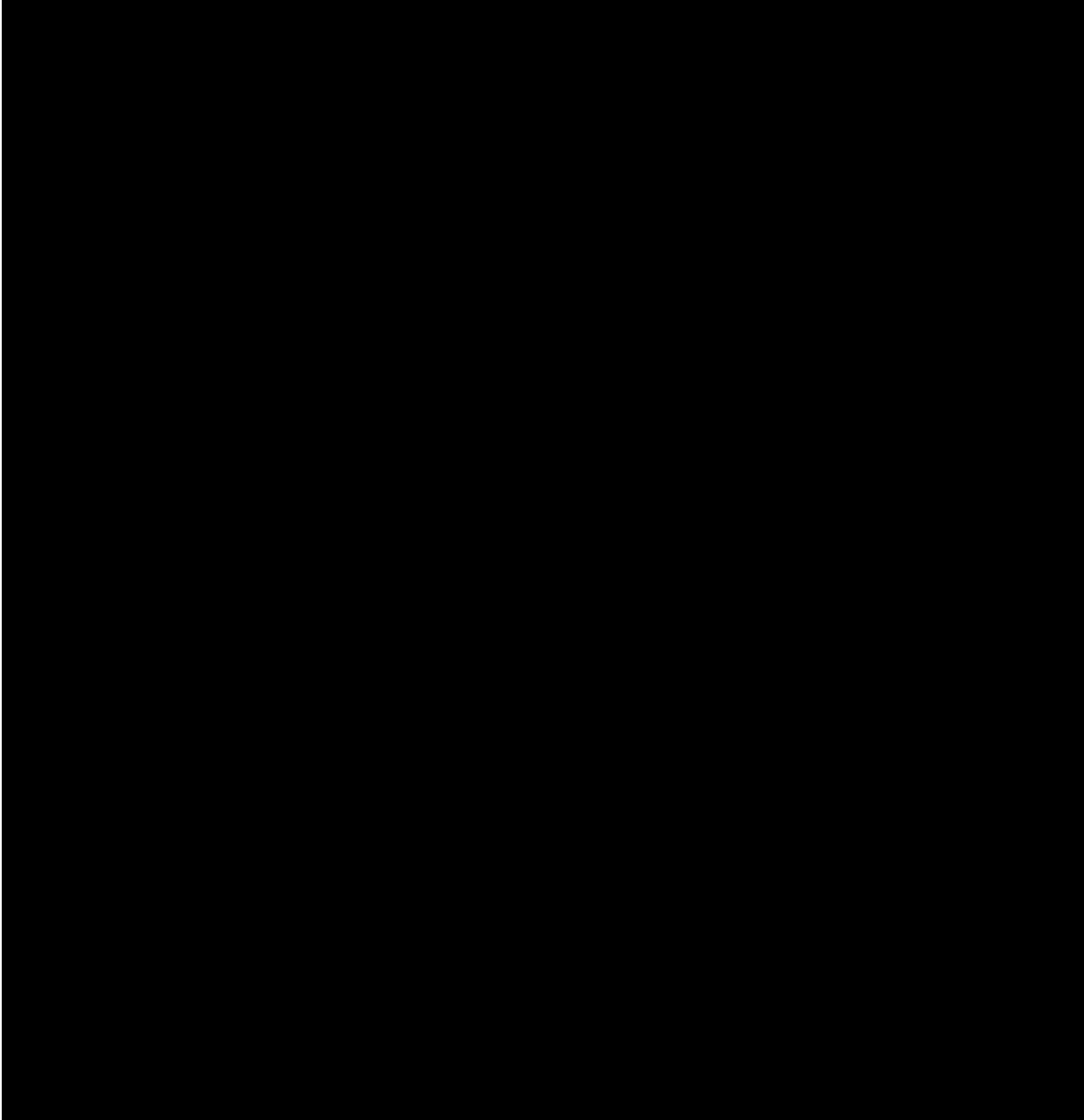
Appendix B

Post-Intervention Provider Survey

<i>Q1. How satisfied are you with: (circle one answer each line)</i>	<i>Very Unsatisfied</i>		<i>Neutral</i>	<i>Very Satisfied</i>	
a. Scheduling of today's appointments with the education class?	1	2	3	4	5
b. Clustering of diabetes classes with today's appointments?	1	2	3	4	5
Q2. How likely are your patients to:	Not likely		Somewhat Likely	Very Likely	
a. Feel this format of scheduling benefitted and increased their self-care abilities?	1	2	3	4	5
b. Increase appointment attendance?	1	2	3	4	5

Appendix C

Letter of Support



Appendix D

Collaborative Institutional Training Initiative Certificate

