A QUALITY IMPROVEMENT PROJECT: ENHANCING PATIENT COMPREHENSION
AND WILLINGNESS TO CHANGE FOLLOWING PREDIABETES EDUCATION

By

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A Quality Improvement Project: Enhancing Patient Comprehension and Willingness to Change Following Prediabetes Education

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Abstract

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Problem: Prediabetes is an increasingly prevalent condition, involving the recognition of elevated blood glucose levels through a diagnostic hemoglobin A1C reading between 5.7% and 6.4%; if left unaddressed, severe complications may occur (American Diabetes Association [ADA], 2016; Menke, Casagrande, Geiss & Cowie, 2015). While research has shown that successful incorporation of the lifestyle modifications of diet and exercise can lower the risk for these complications by up to 58%, the utilization of beneficial modifications has not been reported by all of those with this condition (ADA, 2016; Dorsey & Songer, 2011).

Project Aim: The purpose of this project was to distinguish if newly diagnosed adults with prediabetes who were provided with both verbal and written education, compared to those who only received verbal education, would experience an improved retention of information regarding necessary lifestyle modifications, and demonstrate a willingness to change in a one-month follow-up survey.

Project Method: The theoretical framework for this project is the Transtheoretical Model of behavior change (Prochaska & Velicer, 1997). The project took place across four local, urban primary care clinics. Participants were separated into two groups at the time of agreeing to project involvement using consecutive assignment. Group A received verbal instructions from their healthcare provider regarding prediabetes, and then participated in a teach-back session with the DNP student to further review the ADA's (2016) recommendations for lifestyle modifications. Group B received the same verbal education, but was also provided with an educational leaflet from the ADA (2016) during their teach-back session. Research has shown that more than half of the education patients receive during office visits is either forgotten or incorrect (AHRQ, 2015). To enhance knowledge retention, emphasis was placed on utilizing the validated Teach Back Method (AHRQ, 2015) for all participants. One-month Likert scale follow-up surveys were electronically delivered to all participants for evaluation and assessment of the project's outcomes.

Project Findings: Follow-up surveys were sent electronically to the 13 project participants, 12 completed surveys were returned. Data were gathered and analyzed. The Mann Whitney U Test (Wilcoxon Rank Sum Test) was used to calculate statistical significance (p=<0.05). Significant improvement was noted with Group B's responses to how often they felt the verbal instructions they received regarding their condition were easy to understand (U=5, p<0.0455). Significant findings were also noted with Group B's responses quantifying how often anyone in their healthcare practice asked them to describe how they were going to follow their specific health instructions (U= 3.5, p<0.0251). There were no significant findings seen in the prediabetes management portion of the electronic survey: overall feeling well managing prediabetes (p=0.689), would like to do better with exercising (p=0.873), would like to improve with eating

better foods (p=0.749), currently doing well with exercising (p=0.749), currently doing well with eating better foods (p=0.936). No significance was noted on the last health literacy question in the electronic survey regarding how often participants felt their health care providers and staff had spent time with them (p=0.093).

Conclusion: Including written materials, along with verbal instruction, regarding the new diagnosis of prediabetes and necessary lifestyle modifications can improve ease of patient learning and foster opportunities for health care workers to utilize the validated teach-back method. Further research is recommended to evaluate the relationship between verbal and written education and retention of prediabetes management instruction and willingness to change by incorporating recommended lifestyle modifications.

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A QUALITY IMPROVEMENT PROJECT: ENHANCING PATIENT COMPREHENSION AND WILLINGNESS TO CHANGE FOLLOWING PREDIABETES EDUCATION

Diabetes and obesity are a growing epidemic and major cause of morbidity and mortality plaguing the United States (Menke, Casagrande, Geiss & Cowie, 2015). Prediabetes is the recognition of elevated blood glucose levels through a diagnostic hemoglobin A1C (HbA1c) reading between 5.7% and 6.4% (American Diabetes Association [ADA], 2016). Since it is common for those with this disorder to not experience any signs or symptoms, many are unaware that they have this condition. Shockingly, the current prevalence of prediabetes in America is 38.0% (Menke, Casagrande, Geiss & Cowie, 2015). If this disorder is left unaddressed, it may lead to persistent elevated blood sugars and insulin resistance, resulting in the development of Type II Diabetes (T2D) (ADA, 2016). Once a patient develops T2D, it is difficult for them to control this disease without needing to take medications. T2D can lead to further complications such as strokes, heart attacks, heart disease, hypertension, kidney disease, nerve damage, skin infections, eye and gastrointestinal problems (ADA, 2016).

Significance of Project

To achieve the primary goal of health promotion and disease prevention, it will be necessary for health care providers to maintain awareness of the issue and to take important measures to counsel patients regarding the need for lifestyle modifications. Implementing standards of care involving both written and verbal education could ultimately lead to the achievement of these goals. Despite the efficacy in diagnosing prediabetes, poor adherence to recommended lifestyle modifications can be attributed to a range of factors such as: a lack of patient understanding of the disorder and potential complications, patient unwillingness to change, and decreased provider involvement in education. Specific interventions to improve the

education process could potentially improve the quality of life by reducing serial HbA1c levels, and preventing further complications and the development of co-morbidities. Implementation of new guidelines and educational processes regarding prediabetes education may become more widely utilized with increased evidence-based research, affecting health care across the globe. Health care costs for patients and clinics could be reduced through the use of this low-cost, patient education model, and decrease the need for subsequent visits, the need for dependence upon glucose controlling medications, and the development of disease complications (ADA, 2016).

Statement of the Problem

Research has shown that the risk for developing T2D can be lowered by up to 58% through the successful incorporation of lifestyle modifications including controlling diet and incurring a weight loss of 7% of body weight, and performing moderate exercise for 30 minutes per day, five days a week (ADA, 2016). While research has shown the efficacy in these lifestyle changes, there has still been difficulty with patients adhering to these guidelines. With strong evidence supporting the benefits of lifestyle behaviors in managing prediabetes and preventing diabetes, a higher emphasis should be placed on providers consistently advising patients to adopt the necessary lifestyle modifications consistency with physician advice to patients regarding these necessary modifications (Dorsey & Songer, 2011). Furthermore, research has shown that "40-80% of the medical information patients are told during office visits is forgotten immediately, and nearly half of the information retained is incorrect" (Agency for Healthcare Research and Quality [AHRQ], 2015, p. 18).

Project Purpose

The purpose of this project was to evaluate whether newly diagnosed adults with prediabetes provided with both verbal and written education, compared to only verbal education, experienced an improved retention of information and demonstrated a willingness to implement lifestyle modifications in a one-month follow-up survey.

Definition of Terms

Concepts and Variables

The independent variables involved the distribution of provider formulated written education in comparison to the provision of written and verbal education. The dependent variables (outcomes) were patient comprehension of prediabetes and willingness to change by incorporating necessary lifestyle modifications. Key concepts of this project involve patient education, patient readiness for change, patient willingness to change, efficacy of provider education, differences in written and verbal education provision, retention of education and instruction. The underlying themes involved the relationship between the provider and the patient and how their communication can shape education retention, disease knowledge, and willingness to incorporate new lifestyle modifications.

Concepts and Variables Defined

Prediabetes is a potentially controllable disorder in which patients have an impaired glucose tolerance resulting in abnormally elevated blood glucose levels (ADA, 2016). The diagnostic test for prediabetes is a blood test known as the HbA1c and the results will fall between 5.7% and 6.4%, with above 6.5% considered diabetes (ADA, 2016). As previously mentioned, the ADA (2016) defined lifestyle modifications pertaining to prediabetes as specific diet and exercise regimens to prevent disease progression. Health comprehension, also known as health literacy, is the "degree to which individuals have the capacity to obtain, process, and

understand basic health information and services needed to make appropriate health decisions"
(Institute of Medicine [IOM], 2004). Willingness to change is the determination to implement
necessary lifestyle changes to better one's health, involving several stages in order to reach the
actual action of change (Prochaska & Velicer, 1997). The primary theoretical framework for this
project is The Transtheoretical Model (TTM) of behavior change, which suggests that health
behavior change can be enhanced by fostering knowledge and beliefs. The TTM model has core
constructs known as stages of change: precontemplation, contemplation, preparation, action,
maintenance, relapse, or termination (Prochaska & Velicer, 1997).

Operational Concepts

The project took place in an urban primary care setting. The study involved newly
diagnosed prediabetic patients (diagnosis occurred at maximum six months prior to project
participation) who were counseled at the time of diagnosis regarding the need for lifestyle
modifications. After the healthcare provider explained the diagnosis and recommended
management of prediabetes through a face to face encounter (provider visit) or via electronic
communication, patients were canvassed regarding interest in project participation. Once
involved in the project, all participants had a teach-back session with the DNP student. During
this session, which occurred face to face or via telephone communication, all participants
reviewed the definition of prediabetes, significance and prognosis of the diagnosis, as well as the
necessary lifestyle modifications recommended by their health care provider and the ADA
(2016). Then, in a consecutive manner, half of the participants (Group B) received an
educational leaflet from the ADA regarding the necessary lifestyle modifications. The leaflet
discussed the importance of controlling diet and incurring a weight loss of 7% of body weight, as
well as the benefits of performing moderate exercise for 30 minutes per day, five days a week

(ADA, 2016). The leaflet also clearly defined prediabetes and what potential complications may occur if this disorder is unaddressed. The other half of the participants (Group A) solely received verbal instructions and reviewed the recommendations from their health care provider and the ADA (2016) while speaking with the DNP student. After the completion of their teaching session, one-month follow-up surveys were sent electronically to all participants for evaluation. The survey assessed the project's outcomes, specifically evaluating the participant's comprehension of prediabetes and their willingness to change by incorporating the aforementioned lifestyle modifications. The survey utilized Likert scales and data was collected categorically. Demographics were also collected as part of the electronic survey. After the surveys were reviewed, the data was accumulated and analyzed to generate a dissemination of evidence to be presented to primary care providers and administrators in urban clinics.

Outcome Measures

This DNP project evaluated main outcomes of (1) how well the condition was managed one-month following education, (2) whether there was intention to improve the utilization of lifestyle modifications (diet and exercise), and (3) how effective the method of teaching was. The primary outcomes of interest were improved retention of information and a willingness to implement lifestyle modifications.

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Supportive Literature

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The Cochrane Database of Systematic Reviews, PubMed, CINAHL, MEDLINE, and Google Scholar were the databases used to search for relevant research articles and systematic reviews. Keywords and Boolean phrases included in the search were: "patient education AND prediabetes", "prediabetes education", "health literacy AND prediabetes", "importance of provider education AND prediabetes", "impact of prediabetes education", "prediabetes lifestyle

modification", "prediabetes lifestyle interventions", "Type II Diabetes prevention AND lifestyle modifications", "prediabetes willingness to change", "barriers to effective management of prediabetes", "written and verbal patient education". Research inclusion criteria included: adult patients (age >18 years), human studies in either developed or underdeveloped countries consisting of; randomized controlled trials (RCT), meta-analyses, systematic reviews, case-control studies, cohort studies, case studies, retrospective and qualitative studies, published within the past five to ten years. The search was extended outside of the current recommendation for relevant research articles (within last five years). Exclusion criteria included: non-English language, non-human, and studies with adolescents/children (<18 years of age).

Strengths of Literature Review

Strengths of this literature review included the utilization of several respectable databases. Due to the wide parameters allocated by the inclusion criteria, the literature review yielded a large amount of studies resulting in the inclusion of diverse findings. Some limitations and weaknesses of this literature review stemmed from barriers that were encountered in the literature review process. Upon searching, there was a lack of established standardization of care for patients with prediabetes. Many studies found fell into the exclusion criteria and focused primarily on evaluating patients taking medications for newly diagnosed prediabetes. While this PICO topic may serve in identification of a need for treatment standards, the generation of this evidence may be difficult due to the lack of current research regarding the impact of patient education on this disorder. The search was extended outside of the current recommendation for relevant research articles (within last five years) and included articles within the last ten years.

Key themes were identified from six various systematic reviews, meta-analyses, and qualitative studies. Evans, Greaves, Winder, Fearn-Smith, &Campbell (2007) and Lutfey (2005) focused their research on the effect of the provider-patient relationship and how this interaction may shape health outcomes. Schellenberg, Dryden, Vandermeer, Ha, & Korownyk (2013) and Singh, Ansari, Galipeau, Garritty, Keely, Malcolm … & Sorisky (2012) and Greaves, Sheppard, Abraham, Hardeman, Roden, Evans, & Schwarz (2011) evaluated the positive relationship between comprehensive lifestyle interventions/modifications and a subsequent decrease in the development of T2D in high-risk patients (including those with prediabetes). Although the study by Lam & Leung (2016) did not specifically focus on prediabetes, the researchers highlighted the importance of health literacy, or patient comprehension of the benefits of specific health management.

The research review concluded, despite certain limitations, that provider education impacts patient adherence to lifestyle modifications for those at risk for developing T2D. Overall, the research studies supported the significance, relevance, and importance of this proposed project. A significant emphasis was placed on the positive association between diet and exercise as lifestyle modifications for those with prediabetes and improved health outcomes (Evans, Greaves, Winder, Fearn-Smith, & Campbell, 2007; Greaves et al., 2011; Lam & Leung, 2016; Lutfey, 2005; Schellenberg, Dryden, Vandermeer, Ha, & Korownyk, 2013; Singh et al., 2012). Many of the studies identified the growing need for further research regarding the standardization of prediabetes management. This project would aim to add supportive data to the ongoing research regarding the patient-provider relationship, standardization of prediabetes education, and provider capability to influence patient adherence and willingness to implement treatment plans.

Literature Review

Prediabetes

There is a strong correlation between obesity/physical inactivity, and the development of prediabetes or type 2 diabetes (T2D) (Greaves et al., 2011). Lifestyle modifications based on the American Diabetes Association's 2016 recommendations consist of: controlling diet through incurring a weight loss of 7% of body weight, and performing moderate exercise for 30 minutes per day, five days a week (ADA, 2016). Throughout the past five years, evidence-based findings have shown the position relationship between lifestyle modifications and diabetes prevention. Greaves et al. (2011) stated that the correct utilization of non-pharmacological methods (lifestyle modifications) can reduce the progression of T2D up to 50%. This evidence has led to practice guideline changes, and the current recommendations of promoting "changes in physical activity and dietary intake is now recommended in national and international guidelines as a first line therapy for preventing T2D" (Greaves et al., 2011).

Lifestyle Modifications

Multiple studies focused on the effects of lifestyle modifications, including diet and exercise, in relation to prediabetes management or diabetes prevention. High-risk patients in these studies included those with prediabetes or those with risk factors such as obesity or physical inactivity (Schellenberg, Dryden, Vandermeer, Ha, & Korownyk, 2013). Significant findings from two systematic reviews and one study found that comprehensive lifestyle interventions effectively decreased the incidence of T2D in prediabetic and high-risk patients (Greaves et al., 2011; Schellenberg, Dryden, Vandermeer, Ha, & Korownyk, 2013; Singh et al., 2012).

Provider Role

Lutfey (2005) performed a yearlong qualitative study collecting data from diabetes clinics. Provider-patient interactions were observed with researcher conducted interviews performed afterwards. While the conceptual underpinnings of previous research on adherence focus on objective causes of nonadherence, this study evaluated how practitioners participate in the phenomenon they are observing by attempting to maximize patient adherence in order to improve health outcomes. Evans, Greaves, Winder, Fearn-Smith, & Campbell (2007) conducted a mixed qualitative study with an action framework design in both urban and rural health practices. Both prediabetic and diabetic patients were educated using a specialized educational toolkit. From the data, the researchers concluded that this educational method was a useful resource for both patients and providers. They now particularly focused on four main themes: knowledge and education needs (of both patients and health professionals), communicating knowledge and motivating change, redesign of practice systems to support pre-diabetes management and the role of the health professional.

Improving Health Literacy

While a study by Lam and Leung (2016) focused primarily on patients with T2D, the authors evaluated the importance of health literacy in behavioral modification. An international systematic review of interventional articles in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines was performed. The theme discovered by the six reviewed studies suggests that health literacy oriented programs could foster physical activity behavior in older adults with T2D when carefully designed and investigated.

<center>**Theoretical Framework**</center>

The primary theoretical framework for this project is Prochaska & DiClemente's Transtheoretical Model (TTM) of behavior change, which suggests that health behavior change can be encouraged by fostering knowledge and discussing health beliefs (Prochaska & Velicer, 1997). The TTM model has core constructs known as stages of change, which involve precontemplation, contemplation, preparation, action, maintenance, relapse, or termination (Prochaska & Velicer, 1997). The precontemplation stage includes those who have not considered incorporating any sort of change; contemplation includes those who have not firmly decided whether to change, and characteristically, are not interested in performing changes within the next month; preparation stage includes those planning to act/change within the next month; action stage involves actively implementing the change/new behavior; maintenance follows the successful adoption of new behaviors and typically includes the subsequent six months to five years after implementation begins; relapse occurs when old behaviors take over; and finally, termination occurs when the change is discontinued completely (Prochaska & Velicer, 1997).

A major goal of this project was to assist the sample population in moving from precontemplation to contemplation, preparation, and action. Since this project evaluated patients early in their diagnosis, the Teach Back Method was used to discuss the diagnosis, significance of lifestyle modifications, and importance of implementing change to improve health outcomes. A portion of the one-month follow-up survey evaluated whether the patient had already incorporated lifestyle modifications, or if they had been planning to, and therefore indicated which stage of the TTM they fall into after participating in the project.

Project Assumptions

First, it was assumed that an important relationship between the provider and the patient exists and centers on communication. Next, that provider education influences patient retention of information, disease knowledge, and willingness to incorporate new lifestyle modifications. It was conjectured that the results from this project would likely indicate a positive correlation between thorough teaching regarding necessary lifestyle modifications in newly diagnosed prediabetic patients and their subsequent understanding of: the disorder, the importance of diet and exercise, and their willingness to incorporate these changes. Also, the author assumed that participants who received both verbal and written education would experience an improved retention of information. Supportive literature has emphasized the importance of lifestyle modifications for prediabetic patients influencing the focus of this project, and hopefully impacting practice changes to incorporate both written and verbal education for prediabetes management.

Methods

Specific methods will be discussed, including how the project is designed, what the sample consisted of, how the sample was chosen, methods for data collection, and certain procedures for data accumulation.

Project Design

A descriptive, cross-sectional study was performed using the Teach Back Method to compare newly diagnosed prediabetic patients receiving either solely verbal or both verbal and written education regarding the need for lifestyle modification. Certain advantages occurred from utilizing this project design and included the following: inexpensive design, non-time-consuming, and allowance for valid examination of the independent and dependent variables at a specific point in time. Participants were split into groups, one received both verbal and written

education, and the other received solely verbal education. The first group (receiving both methods of teaching) received an educational leaflet regarding the importance of prediabetes lifestyle modifications including diet and exercise (controlling diet and incurring a weight loss of 7% of body weight, and performing moderate exercise for 30 minutes per day, five days a week) according to the recommendations set forth by the ADA (2016). The second group received provider-oriented education covering the same material as the first group but did not receive written communication.

Project Setting & Sample

The sample derived from four local, urban, primary care offices in Kansas and Missouri. Patients were asked about willingness to participate in the project after their initial appointment or electronic communication discussing the diagnosis and necessary management of prediabetes. Prospective participants were informed of the project's purpose, details about what to expect, and ensured that their information would be protected. Upon data accumulation, analysis, and dissemination of results, measures were taken to maintain security and privacy of their protected information. Participants were required to sign consent and release forms before being successfully included in the sample.

Sample Selection Process

The sample selection process involved a convenience sampling of four primary care offices in Kansas and Missouri over a four-month period of time. Participants were required to have a diagnostic Hemoglobin A1C reading between 5.7% and 6.4% within the past six months, to have never previously been diagnosed with prediabetes or diabetes, and to have spoken with their health care provider regarding their new diagnosis. The project population incorporated female and male adults (patients aged > 18 years old). Participants were required to utilize

English as their primary language. Participants from all socioeconomic statuses and races were eligible. Those with or without insurance were eligible for inclusion, but the majority of patients cared for in this setting carried their company's health insurance plan. The DNP student had a goal to recruit 15-20 participants during the enrollment period. Of an initial 357 potential participants identified as having prediabetes, qualifying search criteria was applied resulting in approximately 100 eligible participants, and 64 potential participants were canvassed regarding interest in project participation. After being contacted and expressing interest, 13 patients consented to project involvement. Of those 13 participants, 12 completed the electronic follow-up survey and one subject was lost to follow-up.

Data Collection Methods

Following the DNP student's contact with participants to review knowledge of prediabetes and necessary lifestyle modifications, electronic surveys were crucial for data gathering and assessment of outcomes. The link for the survey was sent electronically one month following the teach-back session. At the time of sample enrollment, participants verified the best form of electronic communication to reduce loss to follow-up. Reminders were sent out electronically at the end of the one-month follow-up time frame. The first portion of the survey was based on the *My Diabetes Plan* from the California Health Care Foundation (CHCF) which assesses how the patient is managing their disease, what the patient is doing well with (exercising and/or dieting), what the patient wants to do better with, and how sure they are about their ability to incorporate these changes (CHCF, 2008). The CHCF is a reputable resource and therefore holds face validity. The survey was a tool utilized to evaluate patient understanding of the need for lifestyle modifications and their current adherence with recommended prediabetes management. The second portion of the survey was derived from the *Health Literacy Universal*

Precautions Toolkit (2nd Edition) from the AHRQ's Teach Back Method, which assessed the

participant's perspective on the efficacy of the education they received and how well the

provider communicated with the patient (AHRQ, 2015). Three demographic screening questions

were also be included to assess participant's age, gender, and highest level of education. The

Teach Back Method has been well validated and is a reliable tool for evaluating the efficacy of

provider driven education (AHRQ, 2015). The goal for both of these data collection methods

was to achieve internal consistency reliability so that future studies may be able to replicate these

methods, incurring similar results without bias or confounding variables.

Data Collection Procedures

The DNP student and project leader conducted the project. The DNP student educated

staff at the sample sites regarding the project procedures, canvassed potential participants,

obtained consent forms, provided the participants with their teach-back review session,

distributed educational leaflets to participants in Group B, and sent out electronic one-month

follow-up surveys. Follow-up surveys were collected electronically, analyzed, and incorporated

into a dissemination of results to be shared with primary care providers and office administrators,

as well as displayed to the DNP student's peers. With all project parts, data collection, and

dissemination of results, patient information was used only when de-identified and in accordance

with the Health Insurance Portability and Accountability Act (HIPAA) to protect the privacy of

all participants (U.S. Department of Health and Human Services [USDHHS], 2016).

Data Analysis

Using descriptive statistics, the data from the one-month follow-up survey responses

were analyzed. Demographics were collected, specifically age, gender, and highest level of

education. Statistical graphics, figures, and frequency counts were formulated for the

dissemination of findings portion of this project. Descriptive statistics were used to determine the individual and demographic findings from the surveys.

The DNP student met with a statistician through the Biostatistics Department at the University of Kansas Medical Center to determine how best to analyze the findings. Frequency counts were generated for overall results as well as comparative findings from Group A and Group B. The Mann Whitney U Test (Wilcoxon Rank Sum Test) was used to evaluate the significance of the results from questions 1-8. Questions 1-5 utilized a 5-point Likert scale with responses of Strongly Agree, Agree, Neutral, Disagree, or Strongly Disagree. Each response was coded by a significant value (Strongly Agree= 5 points, Agree= 4, Neutral= 3, Disagree=2, Strongly Disagree=1). Questions 6-8 relied on responses using a 4-point Likert scale of Always, Usually, Sometimes, and Never. These responses were also coded with numerical values for analysis (Always=4, Usually =3, Sometimes=2, Never=1).

Findings

Originally, thirteen eligible adult participants consented to project participation, but twelve completed the project. The participants were contacted via preferred method (either phone or in person) for their one-on-one teach-back session with the DNP student. All participants were English speaking and had completed at least four-years of college, indicating ability to read and comprehend teaching documents. All participants were newly diagnosed with prediabetes and had discussed the significance of this new diagnosis, along with necessary management, with their healthcare providers.

Demographics

Participants included two males (16%), and ten females (83%). The twelve participants were separated into either Group A or Group B. Four females (33%) and two males (16%) were

in Group A (receiving only verbal education), and six females (50%) were in Group B (receiving both verbal and written education). In Group A, two participants (33%) were between the ages of 25 and 34, two participants (33%) were between 35 and 44, one (16%) between 45 and 54, and one (16%) between the ages of 55 and 64 years old. In Group B, one participant (16%) was between the age of 25 and 34 years old, two (33%) were between the age of 35 and 44, one (16%) was between 45 and 54, and one (16%) was aged 65 and 74. Furthermore, in Group A six participants (50%) had completed four-years of college, and six participants (50%) held a graduate level degree. Group B, had an equal distribution of participants with six (50%) having completed four-years of college, and six (50%) holding a graduate level degree.

Prediabetes Management

Questions 1-5 on the electronic follow-up survey assessed participants current attitudes towards prediabetes management, as well as what they would like to improve upon. In response to how well participants felt they were managing their prediabetes, three participants (50%) of Group A (n=6) agreed that they were doing well, and three participants (50%) had neutral feelings. In Group B (n=6), four (66.67%) agreed they were doing well, and two (33.33%) felt neutral. When comparing the two groups responses, there was not a statistically significant difference with responses regarding overall effective prediabetes management (U=15, p=0.689).

Improving Exercise Habits

Three participants from Group A (50%) were in strongly agreement, and three (50%) were in agreement that they would like to do better with exercising. For Group B, four (66.67%) were in strong agreement, one (16.67%) was in agreement, and one (16.67%) felt neutral regarding whether they would like to improve their exercising. In comparison, there was not a

statistically significant difference in responses between the two groups when assessing whether participants would like to do better with exercising ($U= 16.5$, $p= 0.873$).

Improving Eating Habits

Comparing whether they would like to improve their eating habits, Group A resulted with one participant (16.67%) in strong agreement, and five (83.33%) in agreement that they would like to do better. Group B found one participant (16.67%) being in strong agreement that they would like to do better with eating, four (66.67%) were in agreement, and one (16.67%) was neutral. From analysis, there was not statistically significant difference in responses between the two groups in regards to whether participants would like to improve their eating habits ($U= 15.5$, $p= 0.749$).

Current Exercise Habits

The participants responded with how well they felt they were currently doing with exercising. Group A's participants responded with the following: two (33.33%) were in agreement, three (50%) were neutral, and one (16.67%) was in disagreement with how well they were doing exercising. In Group B, two (33.33%) agreed, two (33.33%) were neutral, and one (16.67%) disagreed that they were doing well with exercising. The responses between the two groups did not show any statistically significant differences ($U= 15.5$, $p= 0.749$).

Current Eating Habits

Finally, in regards to doing well with eating better foods, Group A's participants found three (50%) agreed, two (33.33%) were neutral, and one (16.67%) disagreed about how well they were doing with eating better. In Group B, four (66.67%) agreed, and two (33.33%) disagreed that they were doing well eating better foods. There were not any statistically significant

differences in participants' response to how well their current eating habits were ($U= 17$, $p= 0.936$).

Ease of Understanding Condition Management Instructions

Follow-up survey questions 6-8 focused on health literacy and compared results from Group A (receiving only verbal education) to Group B (receiving both written and verbal education). In regards to how often verbal instructions regarding their condition were easy to understand, Group A had one participant (16.67%) reply always, three (50%) reported usually, and two (33.33%) stated sometimes. Group B's participants responded five (83.33%) always, and one (16.67%) usually. The differences in findings between the two groups were statistically significant ($U=5$, $p= 0.0455$), indicating a positive relationship between providing both written and verbal education and how easily patients comprehend the instructions they receive to manage their condition.

Teach Back

As part of the continued health literacy questions on the follow-up survey, participants were asked how often anyone in their health care practice asked them to describe how they were going to follow the instructions for prediabetes management. In Group A, one participant (16.67%) responded usually, four (66.67%) stated sometimes, and one (16.67%) said never. In Group B, four participants (66.67%) responded always, one (16.67%) usually, and one (16.67%) said sometimes. The difference in findings between the two groups were statistically significant ($U= 3.5$, $p= 0.0251$), indicating a positive relationship between patients receiving both verbal and written education and how often they perceived their health care team utilized the teach back method to review their prediabetes management instructions.

Adequacy of Time Spent Teaching

Finally, the last question of the health literacy portion in the electronic follow-up survey focused on how often the health care team spent enough time with each participant. Group A's responses were two participants (33.33%) stated usually, and four (66.67%) responded sometimes. In Group B, two participants (33.33%) responded always, three (50%) usually, and one (16.67%) stated sometimes. There was no statistical significance when comparing the difference in responses (U= 7, p= 0.093).

Participant Comments

While the data analyzed from this project was generated from electronic follow-up surveys, many of the participants provided additional comments during their individual teach-back session. The majority of participants expressed a desire to receive a specifically individualized treatment plan pertaining to diet and exercise, tailored to their unique needs. All twelve of the participants (100%) worked for the same company and identified having a sedentary lifestyle and lack of free time as major barriers to incorporating the recommended lifestyle modifications to manage their condition. All twelve participants (100%) were open to utilizing various resources such as health coaches, athletic trainers, and nutritionists.

Discussion

As prediabetes becomes more prevalent in the United States, health care teams will need to discover effective methods in educating their newly diagnosed patients regarding necessary lifestyle modifications. Specific barriers to achieving this goal may stem from a lack of patient understanding of the disorder and potential complications, patient unwillingness to change, and/or decreased provider involvement in education (ADA, 2016). Furthermore, research has shown that patients are unable to recall more than half of the information learned during their appointments (AHRQ, 2015). These barriers signify a need for improved education techniques

in the health care setting, particularly for patients with prediabetes to avoid progression and worsening of the condition. This DNP project focused on evaluating whether newly diagnosed adults with prediabetes who were provided with both verbal and written education, compared to those only receiving verbal education, experienced an improved retention of information and demonstrated a willingness to implement lifestyle modifications in a one-month follow-up survey. The findings showed statistical significance in Group B's (receiving both forms of education) responses regarding how often they perceived their health care team utilized the teach back method during the teaching process ($U= 3.5$, $p= 0.0251$), and also indicated a positive relationship for participants in Group B with ease of comprehension regarding the instructions they received to manage their condition ($U=5$, $p= 0.0455$). These findings are in accordance with a research study by Evans, Greaves, Winder, Fearn-Smith, & Campbell (2007) in which both prediabetic and diabetic patients were educated using a specialized educational toolkit, which proved to be useful resource for both patients and providers. The significance of these findings also correlates to Lam & Leung (2016) where emphasis is placed on the importance of health literacy and disease management.

While research has shown that comprehensive lifestyle interventions effectively decreased the incidence of T2D in prediabetic and high-risk patients (Greaves et al., 2011; Schellenberg, Dryden, Vandermeer, Ha, & Korownyk, 2013; Singh et al., 2012), results comparing current prediabetes management and goals to improve participant's lifestyle did not yield a statistically significant difference in this project. When asked about their feelings regarding overall current prediabetes management, current diet and exercise regimens, and goals to improve their lifestyle, both groups answered similarly. This could be due to the specific population utilized for this project. All (100%) of the participants worked in a sedentary position

and cited inability to prioritize a healthy lifestyle as a major barrier to complying with the proposed treatment regimen. Lutfey (2005) performed a yearlong qualitative study collecting data from diabetes clinics and observed provider-patient interactions, evaluating how practitioners participate in the phenomenon they are observing by attempting to maximize patient adherence in order to improve health outcomes. This study signifies the need to improve the provider-patient interaction and reiterates the importance of utilizing new methods and tools throughout the educational process.

There were five assumptions prior to the implementation of this project. First, it was assumed that an important relationship between the provider and the patient exists, which relies on effective communication. Second, that provider education influences patient retention of information, disease knowledge, and willingness to incorporate new lifestyle modifications. It was conjectured that the results from this project would likely indicate a positive correlation between thorough teaching regarding necessary lifestyle modifications in newly diagnosed prediabetic patients and their subsequent understanding of: the disorder, the importance of diet and exercise, and their willingness to incorporate these changes. Also, the author assumed that participants who received both verbal and written education would experience an improved retention of information. While the findings of this project did not clearly show the importance of both verbal and written education regarding lifestyle modifications for prediabetic patients, it did stress the effect written materials can have on the patient's perception of how thoroughly instructions have been explained and also aided in their ease of understanding what is expected of them. Future research should be conducted to further prove the importance of utilizing written education materials and spending more time utilizing the teach-back method, which will

hopefully influence practice change to incorporate both written and verbal education not only for patients with prediabetes, but for those with a wide variety of diseases/conditions.

There were several limitations to this project. While a large number of patients were canvassed regarding project involvement, a small sample size was accrued, which limits the project's significance of findings, ability to perform specific statistical analysis, and the overall generalizability of findings. While the sample was gathered from four different primary care sites, each participant worked for the same company and therefore had a higher education background than the general public may have. Since this project consisted of an initial teaching/review session and one-month follow-up survey, the overall length of the project did not allow time for much change to occur with each participant's lifestyle habits. Due to time constraints, follow-up laboratory testing of the hemoglobin A1C could not be re-evaluated, which would have quantified a positive, neutral, or negative change since their diagnostic testing, and shown the efficacy in patient comprehension and implementation of the lifestyle recommendations. The project relied on a follow-up survey one month following the teaching session, which allowed for a chance of loss to follow-up. One participant out of the initial 13 failed to complete their follow-up survey, resulting in a total sample size of 12. Furthermore, the electronic survey relied on self-reporting, which allowed change for under or over-reporting to occur. Finally, the electronic survey only consisted of eight survey items and three demographic questions. A more comprehensive set of knowledge, comprehension, and readiness to change questions could have been included without strict time constraints.

Conclusion

Overall, while the findings of this project did not fully support the hypothesis, the data did show that the use of both written and verbal education can assist with patient comprehension

of teaching points, and also showed a positive response in participants' perception of how often their health care team asked them to describe how to specifically follow their recommendations for prediabetes management. Group B participants (who received both verbal and written education) responded five (83.33%) always, and one (16.67%) usually, indicating a positive relationship between providing both written and verbal education and how easily patients comprehend the instructions they receive to manage their condition. In Group B, four participants (66.67%) responded always, one (16.67%) usually, and one (16.67%) said sometimes, showing a positive relationship between patients receiving both verbal and written education and how often they perceived their health care team explained their prediabetes management instructions through the teach back method. While these two survey points showed significant results, the other six items did not show a statistically significant difference. Participants in both groups selected similar answer choices when asked about their overall feelings towards how they were managing prediabetes, how well they were doing exercising and eating better, and whether they would like to improve their exercising or eating habits. There was also no significant difference in responses when asked about the amount of time spent reviewing condition management and lifestyle modifications. Future research should focus on the before and after attitudes of patients newly diagnosed with prediabetes, and specifically assess their readiness to change. Future research should also focus on investigating the barriers when these attitudes and behaviors do not change, despite a more rigorous educational process when teaching patients about the importance of prediabetes management. Based on the verbal feedback during the one-on-one teaching sessions, participants would like to have their provider incorporate specifically tailored treatment regimens, including diet and exercise plans to meet their individual needs. Further research is recommended to assess effective diet and exercise

plans for patients with sedentary lifestyle or other barriers to enacting the recommended lifestyle modifications set forth by the ADA (2016).

Summary

Regardless of the increased provider awareness regarding the significance and prevalence of prediabetes in the United States, patients are still non-compliant with the recommended diet and exercise (ADA, 2016). To achieve the primary goal of health promotion and disease prevention, it will be necessary for health care providers to maintain awareness of the issue and to take important measures to counsel patients regarding the need for lifestyle modifications. Implementing standards of care, both written and verbal, could ultimately lead to the achievement of these goals.

The significance of this problem was recognized, and a doctoral project was generated to focus on the efficacy of implementing health care education standards by utilizing both verbal and written materials to instruct patients about their new diagnosis of prediabetes, and recommended lifestyle modifications. After initially speaking with their provider regarding their new diagnosis, participants had a one-on-one discussion with the DNP student using the teach-back method to review what was learned, and what will be important for their condition management. Lifestyle modifications of diet and exercise were discussed, and half of the participants received a written, educational leaflet from the ADA (2016) reviewing the importance of managing prediabetes. One-month follow-up surveys were electronically sent to all participants to determine if there was an increase in how well participants were managing their prediabetes, dieting, and exercising, and whether they felt they would like to improve on the management of these lifestyle habits. Health literacy questions were also included to assess the efficacy of the teach-back method and to assess if there was a significant difference between the

groups responses in how effective they felt their teaching was. Data was extracted from these survey responses, analyzed, synthesized, and compared to the findings from relative research and evidence-based recommendations. The findings showed that Group B (those who received both forms of education) noted an increased ease of comprehension with the educational process and had a positive perception in how often they felt their health care team asked them to describe how to manage their condition. There was no effect on the feelings of how well their condition was currently being managed and whether they would like to improve their healthy eating and exercise habits. Future research should investigate why these attitudes and habits did not change, despite a more thorough teaching process.

Findings were disseminated to the DNP student's University and project facilitators. The results will be shared with a group of DNP peers and faculty during a campus organized presentation. Hopefully, future research will be inspired from this project, with the goal of enhancing the provider-patient relationship, improve the educational process for providers and patients, and decrease adverse health outcomes for patients with prediabetes.

Figures

Q4 Are you male or female?

Answered: 12   Skipped: 0
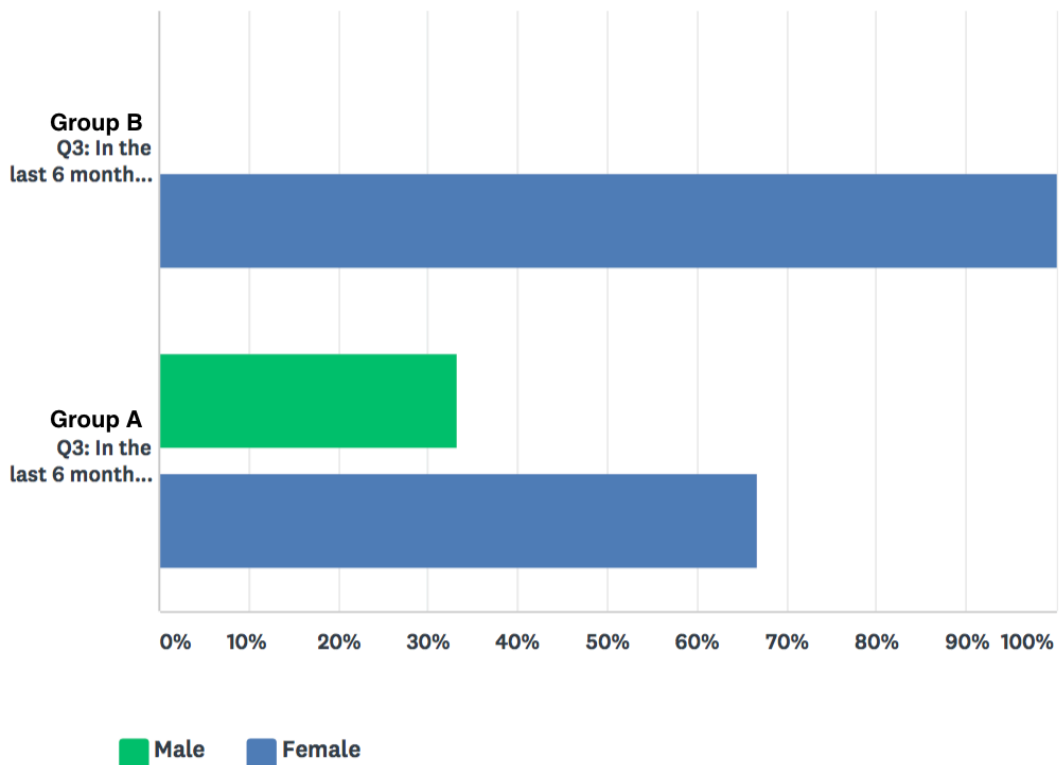
Figure 1. Demographics depicting number of males and females in each Group.

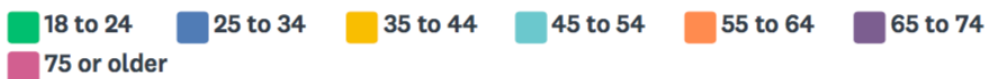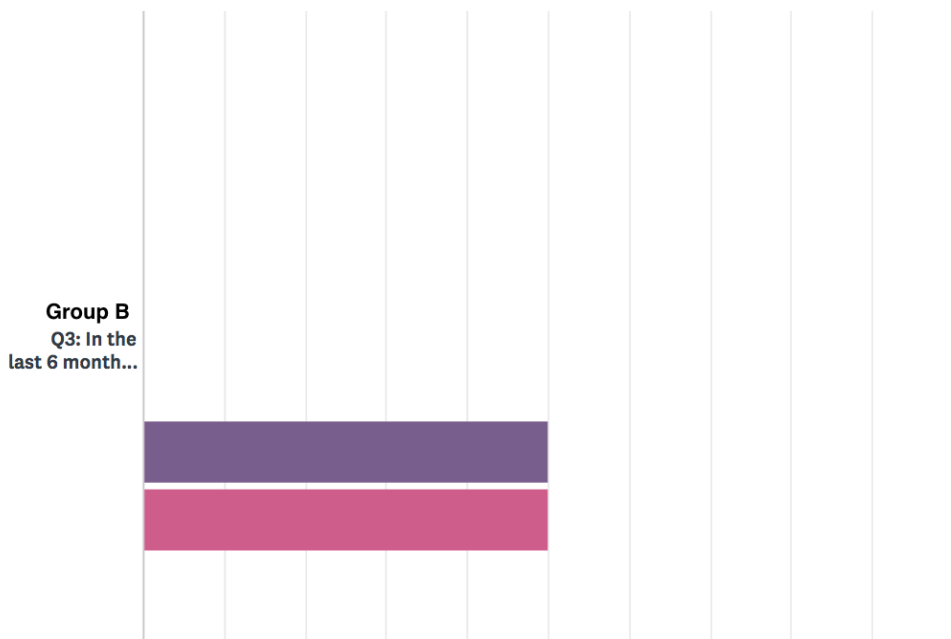# Q5 What is your age?

Answered: 12   Skipped: 0
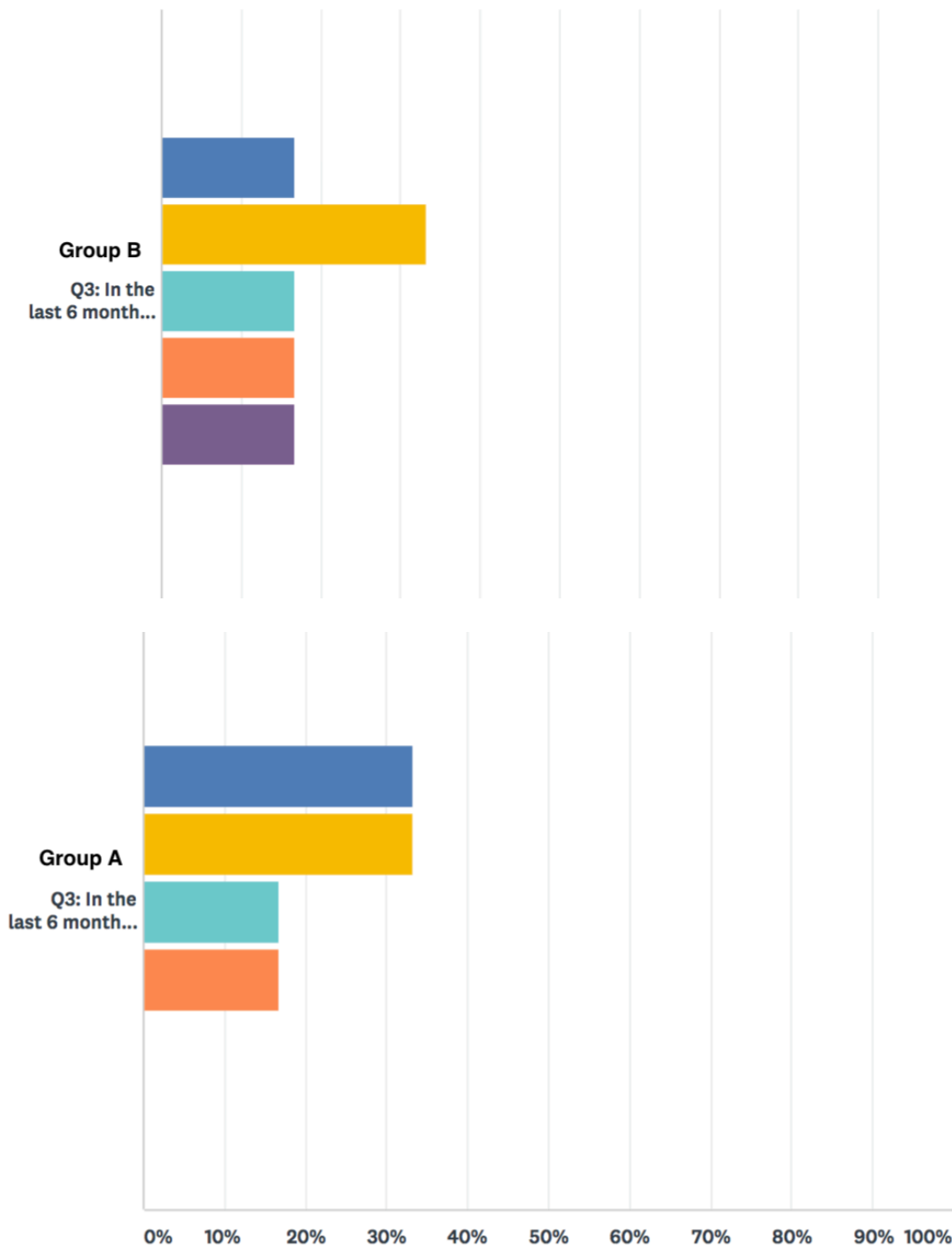
Figure 2. Demographics depicting age ranges for participants in Group A versus Group B.

Q6 What is the highest level of school that you have completed?
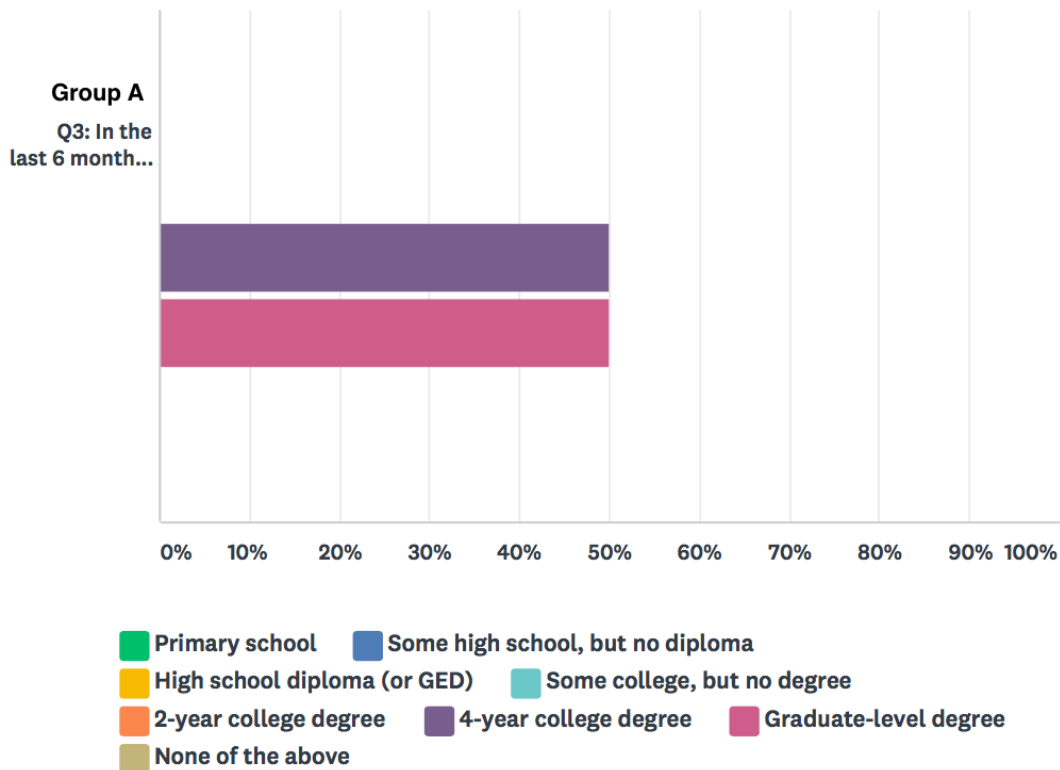
Answered: 12   Skipped: 0

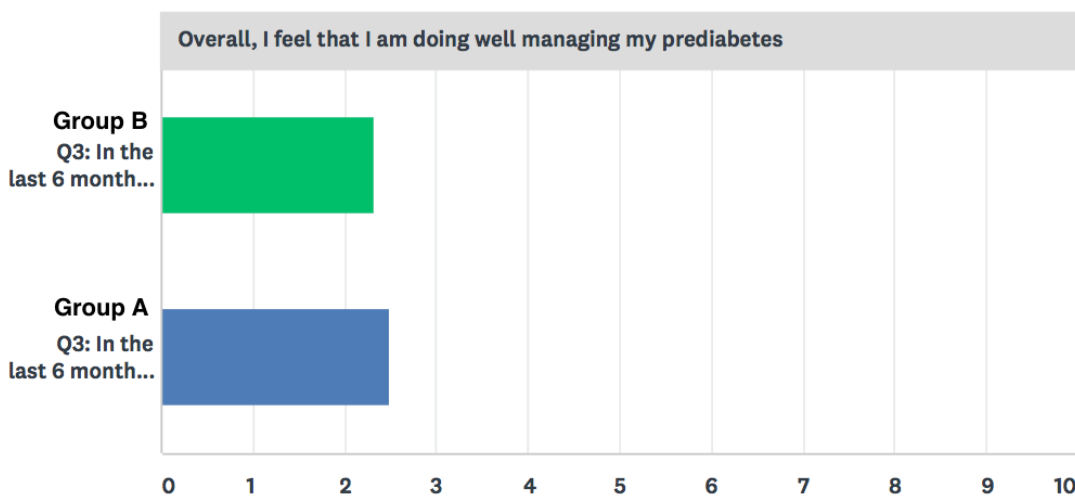*Figure 3.* Demographics showing highest level of education completed for participants in each

Group.

Figure 4. Comparison of Group A and Group B (participants who received educational leaflet) answering question 1 on follow-up survey regarding how well they feel they are managing prediabetes.
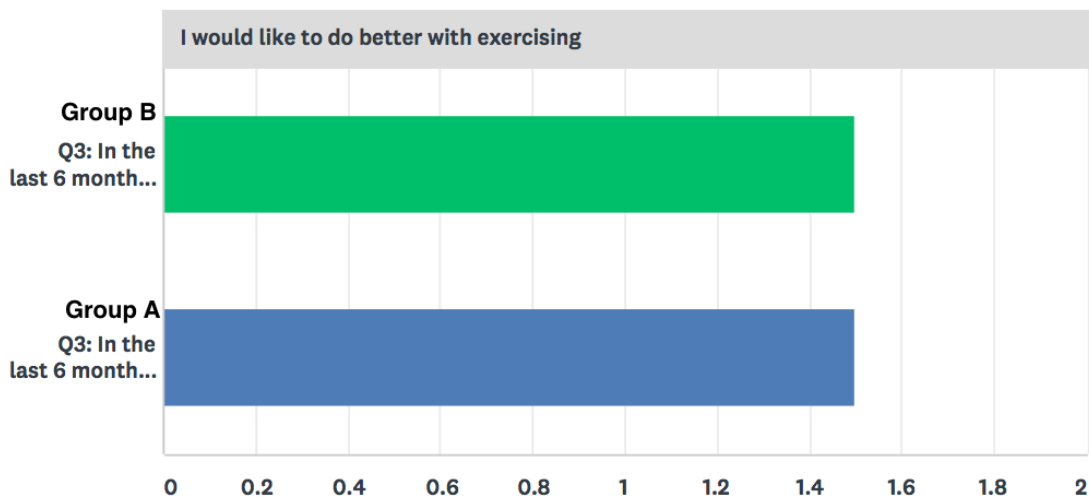
Figure 5. Comparison of Group A and Group B answering question 2 on follow-up survey regarding whether they would like to do better with exercising.
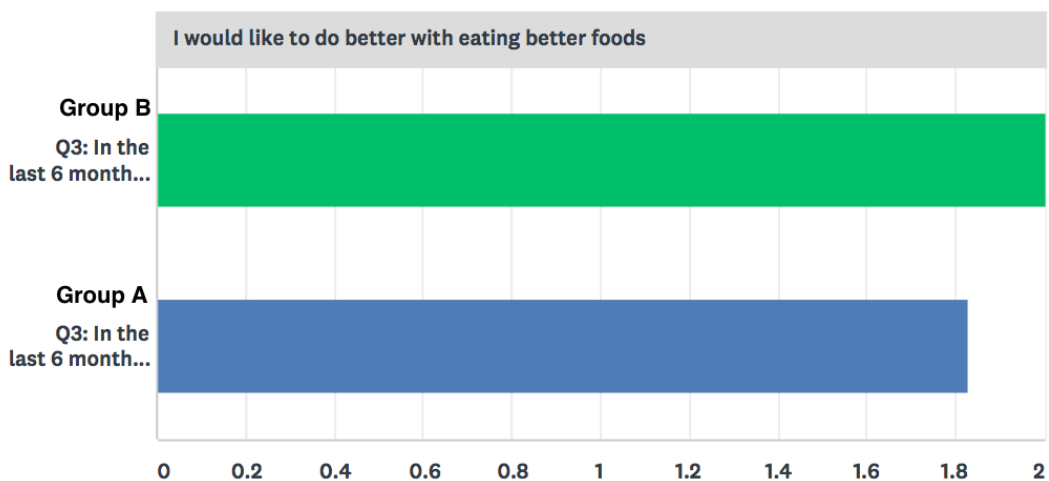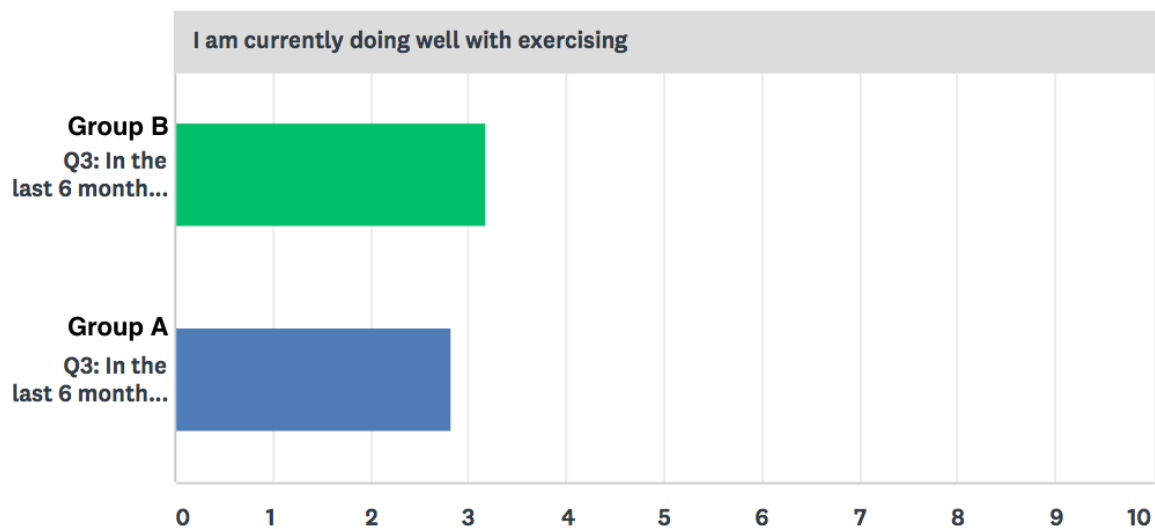

Figure 6. Comparison of Group A and Group B answering question 3 on follow-up survey regarding whether they would like to do improve with eating better foods.

I am currently doing well with exercising

Figure 7. Comparison of Group A and Group B answering question 4 on follow-up survey whether they are currently doing well with exercising.

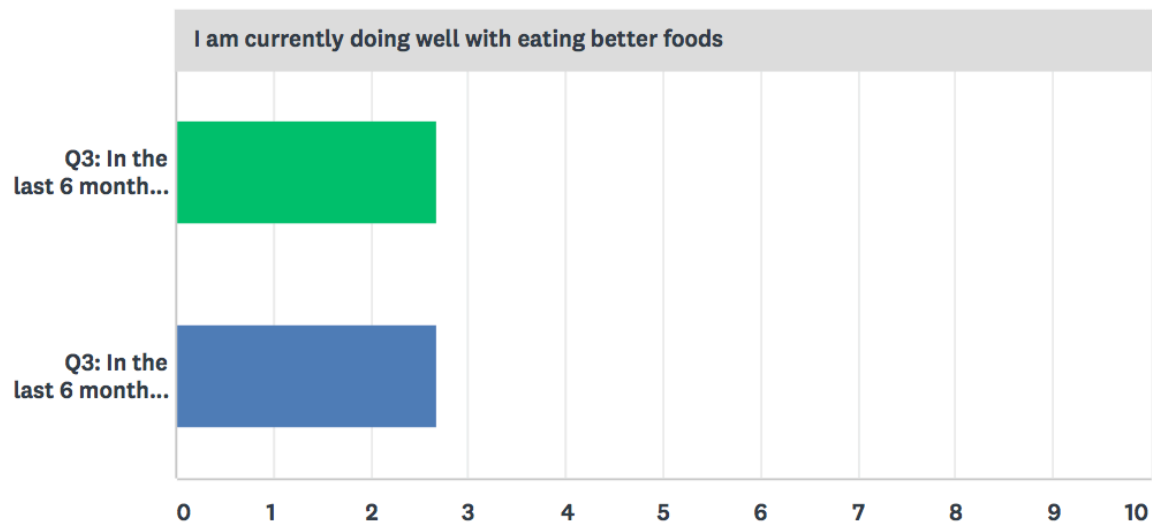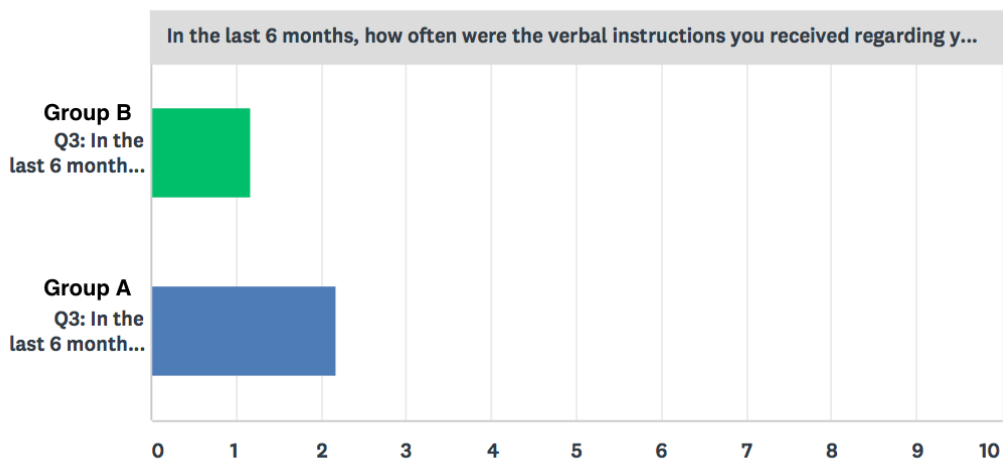**I am currently doing well with eating better foods**

Figure 8. Comparison of Group A and Group B answering question 5 on follow-up survey whether they are currently doing well with eating better foods.

Figure 9. Comparison of Group A and Group B answering question 6 on the health-literacy portion of the follow-up survey regarding how often the verbal instruction received regarding the illness/health condition were easy to understand.
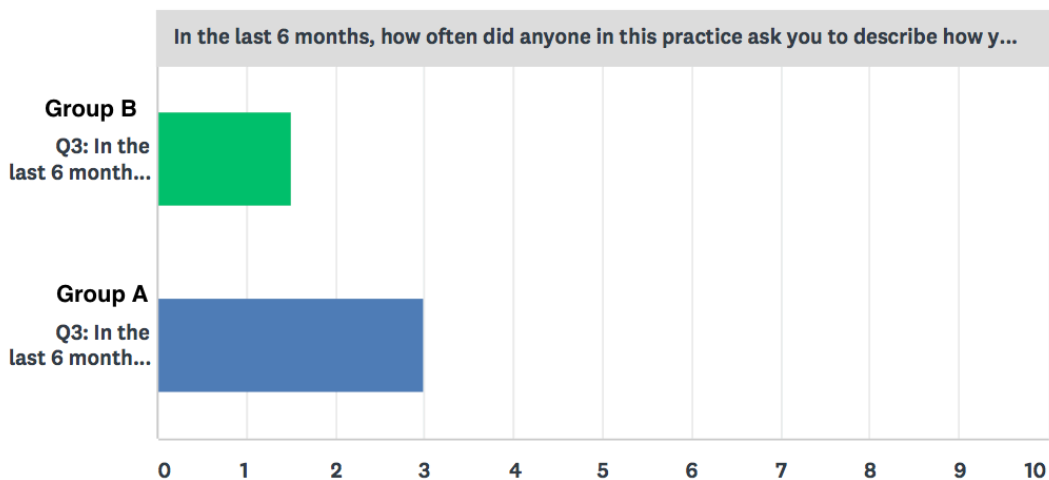
Figure 10. Comparison of Group A and Group B answering question 7 on the health-literacy portion of the follow-up survey regarding how often anyone in the health care practice asked to describe how to follow instructions given.
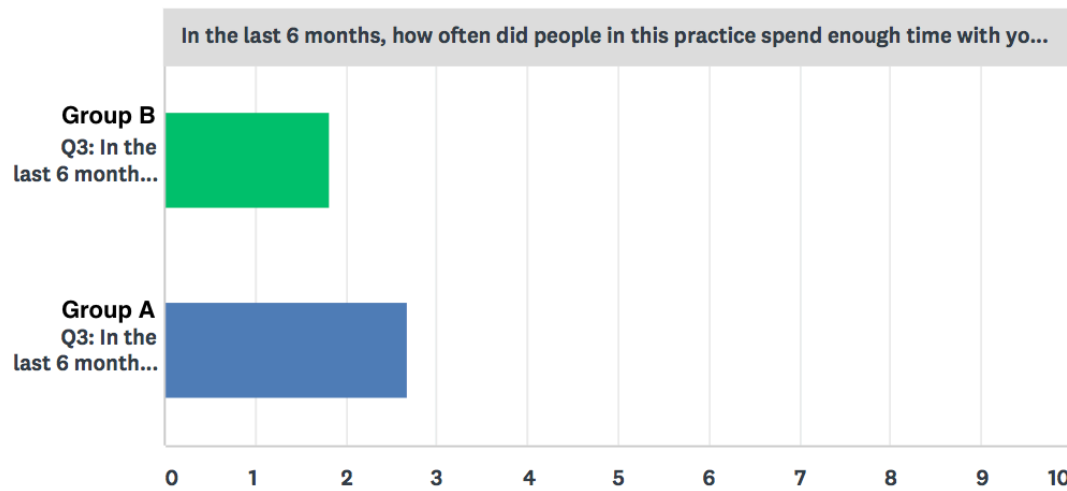
In the last 6 months, how often did people in this practice spend enough time with yo...

Figure 11. Comparison of Group A and Group B answering question 8 on the health-literacy portion of the follow-up survey regarding how often participants felt the health care workers in their practice spent enough time with them.

Tables

QUESTIONS	SA	A	N	D	SD	
1.		7	5			12
2.	7	4	1			12
3.	2	9	1			12
4.		4	5	2	1	12
5.		7	2	3		12

SA = Strongly Agree
A= Agree
N= Neutral
D= Disagree
SD= Strongly Disagree

Table 1. Frequency Count, Prediabetes Management Portion of Health Survey.

Number of responses for each item option from sample survey, N= 12

QUESTIONS	A	U	S	N	
6.	6	4	2		12
7.	4	2	5	1	12
8.	2	5	5		12

A= Always
U= Usually
S= Sometimes
N= Never

Table 2. Frequency Count, Health Literacy Portion of Prediabetes Health Survey.

Number of responses for each item option from sample survey, N= 12

Question	1	2	3	4	5	6	7	8
Subject 1	4	3	4	4	4	4	4	4
2	3	5	4	1	2	4	4	3
3	4	5	4	3	4	4	3	3
4	3	5	5	2	3	4	1	3
5	4	4	3	3	4	4	4	4
6	4	5	4	4	4	4	4	3
7	3	5	5	2	2	3	2	2
8	4	5	5	3	2	3	3	3
9	3	5	4	4	4	2	2	2
10	3	4	4	3	3	3	2	2
11	4	4	4	3	4	2	2	2
12	4	4	4	4	4	3	2	2
Average								
	3.58	4.5	4.16	3	3.25	3.33	2.75	2.75
Standard Deviation								
	0.49	0.65	0.56	0.91	0.85	0.75	1.01	0.72
Mode								
	4	5	4	3	4	4	2	3,2
Median								
	4	5	4	3	4	3.5	2.5	3

For Questions 1-5:
SA =5
A= 4
N= 3
D= 2
SD= 1

For Questions 6-8:
A= 4
U =3
S =2
N= 1

Table 3. Descriptive Results of 12 Subjects from Prediabetes Health Survey.

QUESTIONS	SA	A	N	D	SD	
1.		3	3			6
2.	3	3				6
3.	1	5				6
4.		2	3	1		6
5.		3	2	1		6

Table 4. Frequency Count for Group A, Prediabetes Management Portion of Health Survey.
N = 6

QUESTIONS	SA	A	N	D	SD	
1.		4	2			6
2.	4	1	1			6
3.	1	4	1			6
4.		2	2	1	1	6
5.		4		2		6

Table 5. Frequency Count for Group B, Prediabetes Management Portion of Health Survey.
N=6

QUESTIONS	A	U	S	N	
6.	1	3	2		6
7.		1	4	1	6
8.		2	4		6

Table 6. Frequency Count Group A, Health Literacy Portion of Electronic Survey.
N= 6

QUESTIONS	A	U	S	N	
6.	5	1			6
7.	4	1	1		6
8.	2	3	1		6

Table 7. Frequency Count Group B, Health Literacy Portion of Electronic Survey.
N= 6

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Appendix A: Project Consent

CONSENT FOR PARTICIPATION IN RESEARCH PROJECT:
ENHANCING PATIENT COMPREHENSION AND WILLINGNESS TO CHANGE
FOLLOWING PREDIABETES EDUCATION

You are being asked to join a research project. You are being asked to take part in this project because of your recent diagnosis of prediabetes. You do not have to participate in this research project. The main purpose of research is to create new knowledge for the benefit of future patients and society in general. Research projects may or may not benefit the people who participate.

Research is voluntary, and you may change your mind at any time. There will be no penalty to you if you decide not to participate, or if you start the project and decide to stop early. Either way, you can still get medical care and services at the Cerner Healthe Clinic.

This consent form explains what you have to do if you are in the project. It also describes the possible risks and benefits. Please read the form carefully and ask as many questions as you need to, before deciding about this research.

You can ask questions now or anytime during the project. The researchers will tell you if they receive any new information that might cause you to change your mind about participating.

This research project will take place at the Cerner Healthe Clinic with Aimee Fogel (Miller) guiding your participation. Approximately 15-20 people will be included in the project.

BACKGROUND
Prediabetes is the recognition of elevated blood glucose levels through a diagnostic hemoglobin A1C reading between 5.7% and 6.4%, and is unfortunately, a condition rising in prevalence and significance in America (American Diabetes Association [ADA], 2016; Menke, Casagrande, Geiss & Cowie, 2015). If left unaddressed, this disorder leads to the development of Type II Diabetes, which may result in further, more severe complications, even mortality (ADA, 2016). Research has shown that this risk can be lowered by up to 58% through the successful adoption of lifestyle modifications of diet and exercise (ADA, 2016). Despite the proven efficacy of successful incorporation of these lifestyle changes, there has still been difficulty with patient adherence to these recommendations (Dorsey & Songer, 2011). It has also been noted that physician advocacy for these modifications has not been consistently seen (Dorsey & Songer, 2011). Furthermore, research has shown that more than half of the education Americans receive during office visits is either immediately forgotten or incorrect (Agency for Healthcare Research and Quality [AHRQ], 2015).

PURPOSE
By doing this project, researchers hope to distinguish if newly diagnosed adults with prediabetes who are provided with both verbal and written education, compared to those who only receive verbal education, will experience an improved retention of information regarding necessary lifestyle modifications, and demonstrate a willingness to change in a one-month follow-up

survey.

PROCEDURES

If you are eligible and decide to participate in this project, your participation will last approximately four weeks. Your participation will involve listening to educational information regarding prediabetes at your previously scheduled appointment with your health care provider. One group of participants will solely receive education verbally and the other will have both written and oral education. You will then complete a one-month follow-up survey electronically which is sent back to the researcher. At the completion of this project, you will resume your usual care with your health care provider and there will be no on-going data necessary to obtain from you for this project.

RISKS

With any research project there is a potential for a breach of confidentiality to occur when dealing with protected, private health information. While this is a risk, the researcher will take all measures possible to minimize this from occurring. Methods to reduce the likelihood of protected information from being exposed include: de-identifying all data collected, saving all data and project information on a secure server, and complying with the standards set forth by Health Insurance Portability and Accountability Act (HIPAA). There will not be any physical risks to you throughout inclusion in this project. You are free not to answer any questions or to withdraw your participation in the project at any time.

NEW FINDINGS STATEMENT

You will be told about anything new that might change your decision to be in this project. You may be asked to sign a new consent form if this occurs.

BENEFITS

You may or may not benefit from this project. Researchers hope that the information from this research project may be useful in the future treatment of patients with prediabetes and improve services to these people.

ALTERNATIVES

Participation in this project is voluntary. Deciding not to participate will have no effect on the care or services you receive at the Cerner Healthe Clinic.

COSTS

There is no cost for being in the project.

PAYMENT TO SUBJECTS

There is no payment for this project.

IN THE EVENT OF INJURY

If you have a serious side effect or other problem during this project, you should immediately contact the Project Leader, Dr. Ebbert at 913-588-1649, or Project Coordinator, Aimee Fogel at 913-548-6895 at any time. A member of the research team will decide what type of treatment, if any, is best for you at that time.

CONFIDENTIALITY AND PRIVACY AUTHORIZATION
The researchers will protect your information, as required by law. Absolute confidentiality cannot be guaranteed because persons outside the project team may need to look at your project records. The researchers do not plan on publishing the results of the project. A presentation to KUMC faculty will occur upon the conclusion of the project, at this time they will only discuss group results. Your name will not be used in any publication or presentation about the project.

A federal privacy law called HIPAA protects your health information. By signing this consent form, you are giving permission for KUMC and Cerner to use and share your health information. If you decide not to sign the form, you cannot be in the project.

The researchers will only use and share information that is needed for the project and will only collect health information pertinent to the project. You may be identified by information such as name, phone, date of birth, or other identifiers for data collection. All project information that is presented will have your name and other identifying characteristics removed, so that your identity will not be known. Because identifiers will be removed, your health information will not be re-disclosed by outside persons or groups and will not lose its federal privacy protection.

Your permission to use and share your health information remains in effect until the project is complete and the results are analyzed. After that time, researchers will remove personal information from project records.

QUESTIONS
Before you sign this form, Aimee Fogel or other members of the project team should answer all your questions. You can talk to the researchers if you have any more questions, suggestions, concerns or complaints after signing this form.

SUBJECT RIGHTS AND WITHDRAWAL FROM THE PROJECT
You may stop being in the project at any time. Your decision to stop will not prevent you from getting treatment or services at Cerner. The entire project may be discontinued for any reason without your consent by the investigator conducting the project.

You have the right to cancel your permission for researchers to use your health information. If you want to cancel your permission, please email to Dr. Ebbert (debbert@kumc.edu) or Aimee Fogel (afogel@kumc.edu). If you cancel permission to use your health information, you will be withdrawn from the project. The research team will stop collecting any additional information about you. The research team may use and share information that was gathered before they received your cancellation.

CONSENT
Aimee Fogel or the research team has given you information about this research project. They have explained what will be done and how long it will take. They explained any inconvenience, discomfort or risks that may be experienced during this project.

By signing this form, you say that you freely and voluntarily consent to participate in this research project. You have read the information and had your questions answered.
You will be given a signed copy of the consent form to keep for your records.

_____
Print Participant's Name

_____   _____   _____
Signature of Participant   Time   Date

_____
Print Name of Person Obtaining Consent

_____   _____
Signature of Person Obtaining Consent   Date

Appendix B: Human Subjects Quality Improvement Application

KUMC Human Subjects Committee: Request for Quality Improvement Determination

KUMC HUMAN SUBJECTS COMMITTEE

REQUEST FOR
QUALITY IMPROVEMENT/QUALITY ASSURANCE DETERMINATION

THIS FORM MUST BE TYPED

Project Leader: Diane Ebbert, Ph.D., APRN, FNP-BC	
Department: Doctorate of Nursing Practice	
Email: debbert@kumc.edu	Phone: 913-588-1649
Alternate Contact Person (e.g., Project Coordinator): Aimee Fogel	
Email: afogel@kumc.edu	Phone: 913-548-6895

Project Title:

Enhancing Patient Comprehension and Willingness to Change Following Prediabetes Education

Project Number, Version and/or Date:

Proposal Presented 03/10/2017 Submitted to IRB 04/03/2017

1. **Briefly state the purpose of the proposed project.** *(Attach project plan if available.)*

   The purpose of this project is to evaluate whether newly diagnosed adults with prediabetes provided with both verbal and written education, compared to only verbal education, experience an improved retention of information and demonstrate a willingness to implement lifestyle modifications in a one-month follow-up survey.

The theoretical framework for this project is the Transtheoretical Model (TTM) of behavior change (Prochaska & Velicer, 1997). The project will take place at four local, urban primary care clinics. Participants will be separated into two groups at the time of diagnosis, with half in Group A receiving verbal instructions regarding prediabetes using the ADA's recommendations for lifestyle modifications. The second half, Group B, will receive the same verbal education, but also be provided with an educational pamphlet. As research has shown that more than half of the education patients receive during office visits is either immediately forgotten, or incorrect, emphasis will be placed on utilizing the validated Teach Back Method for all participants (AHRQ, 2015). One-month, Likert-type follow-up surveys will be electronically sent to all patients for evaluation to assess the project's outcomes. After the data is analyzed, a dissemination of findings will be shared with University faculty

Revised 10/4/16

in a Doctoral Defense presentation and shared with the primary care providers, administrators, and staff at the Project site.

2. **Describe the research that has already demonstrated the effectiveness of your intervention.** *(Cite research and/or attach documentation about the national program or standard you are implementing)*

Key themes were identified from six various systematic reviews, meta-analyses, and qualitative studies. Evans, Greaves, Winder, Fearn-Smith, &Campbell (2007) & Lutfey (2005) focused their research on the effect of the provider-patient relationship and how this interaction may shape health outcomes. Schellenberg, Dryden, Vandermeer, Ha, & Korownyk (2013) and Singh, Ansari, Galipeau, Garritty, Keely, Malcolm … & Sorisky

(2012) and Greaves, Sheppard, Abraham, Hardeman, Roden, Evans, & Schwarz (2011) evaluated the positive relationship between comprehensive lifestyle interventions/modifications and a subsequent decrease in the development of T2D in high-risk patients (including those with prediabetes). Although the study by Lam & Leung (2016) did not specifically focus on prediabetes, the researchers highlighted the importance of health literacy, or patient comprehension of the benefits of specific health management. The research review concluded, despite certain limitations, that provider education impacts patient adherence to lifestyle modifications for those at risk for developing type 2 diabetes. Overall, the research studies included supported the significance, relevance, and importance of this proposed project, and placed a significant emphasis on the positive association between diet and exercise as lifestyle modifications for those with prediabetes and improved health outcomes. (Evans, Greaves, Winder, Fearn-Smith, & Campbell, 2007; Greaves et al., 2011; Lam & Leung, 2016; Lutfey, 2005; Schellenberg, Dryden, Vandermeer, Ha, & Korownyk, 2013; Singh et al., 2012). Many of the studies identified the growing need for further research regarding the standardization of prediabetes management. This project would aim to add supportive data to the ongoing research regarding the patient-provider relationship, standardization of prediabetes education, and provider capability to influence patient adherence and willingness to implement treatment plans.

3. **What types of data are needed for the project?**
   Post initial prediabetes education, electronic surveys will be crucial for data gathering and assessment of outcomes. The link for the survey will be emailed to participants. At the time of sample enrollment, patients will verify the best form of electronic communication to reduce loss to follow-up. Reminders will be sent out electronically at the end of the one-month follow-up time frame (following the initial teaching session). The first of two surveys to be evaluated will be based on the My Diabetes Plan from the California Health Care Foundation [CHCF] has five questions that will be used in a Likert scale survey. This tool will evaluate patient understanding of the need for lifestyle modifications and adherence to prediabetes management, particularly how the patient is doing with exercising and dieting, what they would like to do better with, and how sure they are about their ability to

incorporate these changes (CHCF, 2008). The second survey, from the Agency for Healthcare Research and Quality's [AHRQ] Health Literacy Universal Precautions Toolkit (2nd Edition) will assess the patient's perspective on the efficacy of the education they received and how well the provider communicated with the patient (AHRQ, 2015). Seven

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questions will focus on the receipt and understanding of verbal education, and two questions will assess patient perspective of their written instructions. The goal in using these surveys will be to achieve internal consistency reliability so that future studies may be able to replicate these methods, incurring similar results without bias or confounding variables. Included in the electronic survey will be demographic questions to identify participants age, gender, and highest level of education.

4. **Do you need access to identifiable patient records to complete the project?**

☒ **NO**
☐ **YES**

    If yes, who holds the records?

    If yes, which patient identifiers or demographics are needed for the project?

5. **Which descriptions best fits your project?** *Check all that apply:*

☒ Determine if a previously-implemented clinical practice improved the quality of patient care

☐ Evaluate or improve the local implementation of widely-accepted clinical or educational standards that have been proven effective at other locations

☐ Gather data on hospital or provider performance for clinical, practical or administrative uses

☐ Conduct a needs assessment to guide future changes in local health care delivery or to support other improvements at KUMC

☐ Perform an analysis to characterize our patient population/clients to improve quality of services

☐ Implement programs to enhance professional development for providers and trainees

☒ Measure local efficiency, cost or satisfaction related to standard clinical practices

☒ Develop interventions or educational strategies that improve the utilization of recognized best practices

☒ Implement strategies to improve communication within our local healthcare environment

☒ Improve tools for patients that promote education, health literacy or treatment plan compliance

6. **Does your project involve any of the following aspects?** *Check all that apply:*

☒ Randomizing participants into two or more groups
    ☐ Student/residents/trainees are randomized
    ☐ Patients are randomized
    ☐ Healthcare providers are   randomized

☐ Units of the hospital are randomized
☒ Other *Specify:* Convenience sampling with consecutive assignment of participants into Group A or Group B

☒ Surveying a patient population

☐ Developing clinical practice guidelines

☐ Developing new curriculum recommendations

☐ Developing or refining a new assessment tool

☒ Implementing a novel approach to care that may improve patient outcomes

7. **Which institutions are involved in the project?**
   ☐ KUMC only
   ☒ Other institutions   List Cerner Healthe Clinics in Kansas and Missouri

8. **Which individuals or groups will receive the results of your project?**
   ☐ Internal department personnel
   ☐ Hospital representatives
   ☒ University representatives
   ☒ Presentation/publication*
   ☒ Other   Specify Cerner Clinic administrators, providers, and staff

9. **How will your results be used to implement local improvements?**
   Implementation of new guidelines and educational processes would become more widely utilized with increased evidence-based research in the local primary care setting. Upon the dissemination of findings to the local Cerner Healthe Clinics, standards of patient care and education may be positively effected. Moreover, health care costs for

_____   _____
Signature**   **Date**

_____
Type/Print Name

*Any presentation or publication resulting from this project should explicitly state that it was undertaken as quality improvement.

**Ink signature or email from the project leader is required.

FOR OFFICE USE ONLY
Quality Improvement Determination Acknowledged. IRB review is not required.
_____ HRPP Official
_____   _____ Signature   Date

Appendix C: Letter from KUMC Human Research Protection Program

Hello Dr. Ebbert,
We have reviewed Aimee Fogel's proposal. From the IRB standpoint, we agree that the project isn't human subjects research that needs approval by the KUMC IRB.   That means if the project was being done here, we wouldn't require the consent form that was included in the submission because consent forms are not required for QI at our institution.
That said, we are not able to make a QI determination on behalf of the Cerner clinics. They will have their own standards about what they consider research vs. QI and how they want their patient data to be used.
There are no IRB requirements from KUMC. Please proceed with obtaining Cerner's approval for Aimee's project.

Thanks
Karen

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Appendix D: Prediabetes Educational Leaflet

Prediabetes Patient Educational Leaflet from the American Diabetes Association (2016)

PREDIABETES
WHAT IS IT AND WHAT CAN I DO?

STOP DIABETES
American Diabetes Association.

What is prediabetes?

Prediabetes is a condition that comes before diabetes. It means your blood glucose levels are higher than normal but aren't high enough to be called diabetes. There are no clear symptoms of prediabetes. You can have it and not know it.

If I have prediabetes, what does it mean?

It means you might get type 2 diabetes soon or down the road. You are also more likely to get heart disease or have a stroke.

The good news is that you can take steps to delay or prevent type 2 diabetes.

How can I delay or prevent type 2 diabetes?

You may be able to delay or prevent type 2 diabetes with:

- physical activity, like walking
- weight loss if needed – losing even a few pounds will help
- taking medication, if your doctor prescribes it

If you have it, these steps may bring your blood glucose to a normal range. But you are still at a higher risk for type 2 diabetes.

Regular physical activity can delay or prevent diabetes

Being active is one of the best ways to delay or prevent type 2 diabetes. It can also lower your weight and blood pressure, and improve cholesterol levels. Ask your health care team about safe ways of being active for you.

One way to be more active is to try to walk for half an hour, five days a week. If you don't have 30 minutes all at once, take shorter walks during the day.

Weight loss can delay or prevent diabetes

Reaching a healthy weight can help you a lot. If you're overweight, any weight loss, even 7% of your weight (for example, losing about 15 pounds if you weigh 200) may prevent or delay your risk for diabetes.
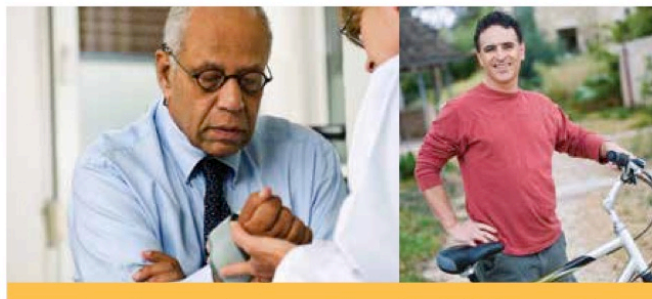
MORE THAN 1 IN 3 AMERICAN ADULTS HAS PREDIABETES

Make healthy choices

Here are some steps you can take to change the way you eat. Small steps add up to big rewards.

- Cut back on regular soft drinks and juice. Have water or try calorie-free drinks.
- Choose lower-calorie snacks, such as popcorn instead of potato chips.
- Eat salad with low-fat dressing and at least one vegetable at dinner every night.
- Choose fruit instead of cake, pie, or cookies.

Cut calories by cutting serving sizes
- Eat smaller servings of your usual foods.
- Share your main course with a friend or family member when you eat out. Or take half home for later.

Cut down on bad fat
- Roast, broil, grill, steam, or bake instead of deep-frying or pan-frying.
- Use a small amount of oil for cooking instead of butter, lard or shortening.
- Try plant based proteins like beans instead of meat and chicken
- Choose fish at least twice a week
- Eat lean meats such as the round or loin cuts, or chicken without the skin.
- Cut back on high fat and processed meats like hot dogs, sausage, and bacon.
- Eat less high fat desserts such as ice cream, cake with frosting, and cookies.
- Avoid margarine and other foods with trans fat.

Track your progress

Write down what and how much you eat and drink for a week. Writing things down makes you more aware of what you're eating and helps with weight loss.

Summing it up

- Diabetes is a serious disease – if you delay or prevent it, you'll enjoy better health in the long run.
- Diabetes is common – but you can reduce your risk by losing a small amount of weight.
- Changing the way you eat and increasing your activity can delay or prevent type 2 diabetes.

Get checked

If you are at increased risk for diabetes, ask your doctor about getting tested at your next visit. Take our risk test at diabetes.org/risktest to find out if you are at risk.

Get started

- Be physically active.
- Make a plan to lose weight.
- Track your progress.

STOP DIABETES
American Diabetes Association

Appendix E: My Diabetes Health Plan Survey

The *My Diabetes Health Plan* from the CHCF (2008) inspired the first half of questions

included in the electronic survey for this project.

My Diabetes Plan

Name: _____ **Date:**
_____

1. **How are you doing with managing your diabetes?**   **Excellent   Good   Not Good   Not Sure**

2. **How were the results of your last A1C test (sometimes called the Hemoglobin AIC test, a three-month average of your blood sugars)?**

   Excellent   Good   Not Good   Not Sure

4. **I want to do better with: _____ Exercising.**

   _____ Eating better foods. _____ Taking my medicine. _____ Checking my blood sugar. _____ Cutting down on smoking. _____ Reducing my stress. _____ Other: _____

3. **I am doing well with: _____ Exercising. _____ Eating better foods. _____ Taking my medicine. _____ Checking my blood sugar. _____ Cutting down on smoking. _____ Reducing my stress.**

   _____ Other: _____

5. **To improve my health, I will work on one of my chosen activities. Here is what I can do:**

   _____
   _____

   _____
   _____ **How much:** _____
   When: _____

   How often: _____

6. **This is how sure I am that I will be able to do this: (circle a number)**

Not sure   **Very Sure**

1   2   3   4   5   6   7   8   9   10

Appendix F: Patient Health Literacy Survey

Questions included in the electronic survey derived from the AHRQ Health Literacy

Survey (2015) including demographic screening.

In the last 6 months, did you see anyone in this practice for a specific illness or for any health condition?
□Yes
  No

In the last 6 months, did anyone in this practice give you spoken instructions about what to do to take care of this illness or health condition?
  Yes
  No

In the last 6 months, how often were these verbal instructions easy to understand?
  Never
  Sometimes
  Usually
  Always

In the last 6 months, how often did anyone in this practice ask you to describe how you were going to follow these instructions?
  Never
  Sometimes
  Usually
  Always

In the last 6 months, how often did people in this practice spend enough time with you?
  Never
  Sometimes
  Usually
  Always

In the last 6 months, did anyone in this practice give you written information about how to take care of your health?
Yes
No → **go to Demographic questions**

In the last 6 months, how often did anyone in this practice explain or walk you through the written information that you were given?
Never
Sometimes
Usually
Always

Demographics:

What is your age?
18 to 24
25 to 34
35 to 44
45 to 54
55 to 64
65 to 74
75 or older

Are you male or female?
Male
Female

What is the highest grade or level of school that you have completed?
8th grade or less
Some high school, but did not graduate
High school graduate or GED
Some college or 2-year degree
4-year college graduate
More than 4-year college degree

Appendix G: Prediabetes Project One-Month Follow-Up Survey

The survey utilized for this project included: 5 questions regarding prediabetes

management, 3 questions regarding health literacy, 1 question regarding written instructions, and

3 demographic questions.

Please answer the following questions with either: Strongly Agree, Agree, Neutral, Disagree, or Strongly Disagree

1. Overall, I feel that I am doing well managing my prediabetes
2. I would like to do better with exercising
3. I would like to do better with eating better foods
4. I am currently doing well with exercising
5. I am currently doing well with eating better foods

Please answer the following questions with either: Always, Usually, Sometimes, or Never

6. In the last 6 months, how often were the verbal instructions you received regarding your illness or health condition easy to understand?
7. In the last 6 months, how often did anyone in this practice ask you to describe how you were going to follow these instructions?
8. In the last 6 months, how often did people in this practice spend enough time with you?
9. In the last 6 months, how often did anyone in this practice explain or walk you through the written information that you were given?

Please answer the following demographics questions appropriately

10. Are you male or female?
    Select male or female

11. What is your age?
    18-24, 25-34, 35-44, 45-54, 55-64, 65-74, or 75 & older

12. What is the highest level of school that you have completed?
    Primary school, some high school but no diploma, high school diploma (or GED), some college but no degree, 2-year college degree, 4-year college degree, graduate-level degree, or none of the above