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Increasing Compliance of Diabetic Screening Eye Exams

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Abstract

Diabetic retinopathy is one of the principal causes of vision loss in middle-age and older adults worldwide. This quasi-experimental study examined the impact of patient diabetic retinopathy education and eye exam screening card on compliance with annual diabetic eye screening.

About 40 participants ranging in ages from 18-80 years of age diagnosed with type 2 diabetes and without having an eye screening exam in the past two years were recruited from a family practice clinic in an underserved community in the Midwest. Outcome measures were completed eye screening exams and knowledge pertaining to diabetic retinopathy. Screening results were compared to a retrospective non-intervention group, and knowledge was compared pre- and post- education within the intervention group. The results showed that 30.8% of the participants completed an eye screening exam by returning the screening card. Using a Fisher's Exact test and a McNemar test, there was an improvement in diabetic retinopathy knowledge from pre- to post-test in one question along with improvement of knowledge in two questions but not statically significant due to the small sample size. This project will foster awareness to patients about the positive consequences of compliancy with prevention measures, specifically in regards to diabetic retinopathy.

Keywords: diabetic retinopathy, compliance, eye screening exam, type 2 diabetes, barriers

Introduction

Diabetes is a disease noted by increased levels of blood glucose as a consequence to problems in insulin production, insulin utilization, or both (Centers for Disease Control [CDC], 2014). Currently, over 29 million individuals are diagnosed with diabetes in the United States (US), and with the increasing obesity rates, lengthened life expectancy, as well as individual racial and ethnic make-up, the overall trend of diabetes is projected to be 44.1 million by 2034 (Center for Disease Control [CDC], 2014; Paksin-Hall, Dent, Dong & Ablah, 2012).

Diabetic retinopathy, a complication commonly seen in patients diagnosed with diabetes, is one of the principal causes of vision loss worldwide, a main reason of vision impairment in patients between the ages of 25 to 74 years of age, and the major cause of new cases of legal blindness in the work-age Americans (Frasier & D'Amico, 2015; American Academy of Ophthalmology Retina/Vitreous Panel, 2014). The frequency of occurrence for retinopathy for all adults with diabetes 40 years of age or older in the United States is 28.5%, or over four million people, and estimated at 34.6% or 93 million people worldwide (American Academy of Ophthalmology Retina/Vitreous Panel, 2014).

As the diabetes epidemic has not yet reached peak incidence, the number of Americans afflicted by vision-threatening diabetic retinopathy is expected to double to over 14 million by the year 2050 with the Hispanic American population experiencing the greatest increase of more than three-fold from 1.2 million to 5.3 million by 2050 (National Eye Institute, 2015). In the state of Kansas, 18.1% of the population is diagnosed with diabetic retinopathy and only 78.4% of the population over the age of 40 has reported receiving a dilated eye exam (Centers for Disease Control, 2015).

Diabetic retinopathy can affect all ethnicities diagnosed with diabetes. In 2012, 68% of those diagnosed with retinopathy were Caucasian (National Eye Institute, 2015). In the more

severe vision threatening cases, those of Hispanic ethnicity were twice as likely, and in African American three times as likely than in the Caucasian population (National Eye Institute, 2016). Early detection, accurate diagnosis, and timely treatment are methods to dramatically decrease the incidence of vision loss related to diabetic retinopathy (Zimmer-Galler et al., 2015). The professional organizations of American Academy of Ophthalmology, American Diabetes Association, and the CDC's National Eye Institute acknowledge the minimum requirement of an annual retinal evaluation for patient with diabetes, but despite these recommendations individuals are still not receiving the recommended eye care (Zimmer-Galler et al., 2015; Paskin-Hall, Dent, Dong & Ablah, 2012).

Problem Statement and Purpose

In the prevention of severe vision loss due to diabetic retinopathy, it is recommended that patients maintain strict blood glucose control and have regular screening of the ocular fundus (Frasier & D'Amico, 2015). In the earliest stages, diabetic retinopathy may not demonstrate any visual impairment or vision loss therefore monitoring eye disease with dilated fundus examination (DFE) is imperative in the prevention of vision loss (Paksin-Hall et al., 2012). In the US, approximately half of the population that are diagnosed with diabetes are screened annually for retinopathy (Zimmer-Galler et al., 2015). The annual healthcare cost for diabetes related vision lost is estimated at \$500 million dollars (CDC, 2015) and rises when patients present for eye care late in their disease course due to the delay in the diagnosis of diabetes, or lack of symptom presentation (Zimmer-Galler et al., 2015). Locally, in Wyandotte County, Kansas 12.9% of the county population has been diagnosed with diabetes (Mid-America Regional Council, 2013).

The purpose of this Doctor in Nursing Practice (DNP) project was to attempt to increase the compliance rates of yearly eye screening exams and foster a reduction in incidence of diabetic related blindness. The goal of this quasi-experimental study was to evaluate the impact of patient diabetic education and eye screening card on compliance with annual diabetic eye screening (see Appendices A for definition of terms).

Facilitators and Barriers

The facilitators for this DNP project included the student investigator, who is an Advanced Practice Registered Nurse (APRN) in a collaborative practice within a family practice clinic setting of an underserved population, and the collaborating physician who is supportive of the project. Barriers included lack of transportation by the patient within the underserved community, inability to obtain eye screening appointment in a timely manner, or a decrease in compliance with return of screening card. Screening card use was promoted providing a self-stamped and self-addressed postcard that participants needed to mail. This project can be sustainability if successful as this type of intervention can be applied to other chronic disease management to improve compliance.

PICOT

Various factors can influence the compliance to obtaining DFE. This project integrated diabetic retinopathy education along with screening cards to increase compliance with screening eye exams. The PICOT question was, “in the diabetic patient population, does providing diabetic retinopathy education and a screening/reminder card increase the compliance rates of diabetic retinopathy eye screening exams compared to diabetic patients who have only verbal reminders to obtain diabetic eye screening exams during a 4 month period at a primary care setting.”

Literature Search

This integrative review explores evidence on factors contributing to patient non-compliance with annual diabetic eye screening exams. The following terms were used for the search: diabetic retinopathy, patient compliance, annual eye examinations, dilated eye examination, diabetes, practice guidelines, barriers, Type 2 diabetes, and Type 1 diabetes. The databases used to search for studies and guidelines included Cumulative Index to Nursing and Allied Health (CINAHL), PubMed, Cochran, American Academy of Ophthalmology, and American Academy Diabetes Association.

From the search, 22 research studies were discovered. The articles ranged from 2007 to the present. Exclusion criteria for studies included older than 2007, non-English language, focus on management of retinopathy, and screening intervals. The research studies were comprised of two evidence-based practice guidelines, four cross-sectional, five cohort studies, four qualitative studies, two systematic reviews with one meta-analysis, and seven randomized control studies. In these research studies, two were evidence level I, two level II, one level III, thirteen level IV, four level V, and one level VI as defined per Melnyk (2015; Melnyk & Fineout-Overholt, 2015).

Synthesis of Evidence

Diabetic retinopathy that is not detected or treated in its early stages can advance to vision loss. Approximately 50-70% of individuals diagnosed with diabetes receive annual DFE (Paksin-Hall et al., 2012). In patients with type 1 diabetes professional associations recommend that the initial dilation and comprehensive eye examination be performed within five years after a confirmed diagnosis of diabetes (American Diabetes Association [ADA], 2016; American Academy of Ophthalmology Retina/Vitreous Panel, 2014). For patients with type 2 diabetes guidelines recommend that patients be referred at time of their diagnosis for their initial dilation

and comprehensive eye examination due to the uncertainty of the duration of elevated blood sugars (ADA, 2016; American Academy of Ophthalmology Retina/Vitreous Panel, 2014).

Studies have revealed common barriers to patient compliance with eyes exams such as shorter duration of disease (Sheppler et al., 2014; Saadine, Donald, Fong & Yao, 2008; Scanlon et al., 2015; MacLennan, et al., 2014), and lack of access (Lindenmeyer et al., 2014; Hatef et al., 2015; Lee et al., 2014; Gower et al., 2013; Dorsey, et al., 2007; Paskin-Hall et al., 2012; Chou et al., 2014; MacLennan et al., 2014; Creuzot-Garcher et al., 2010; Taylor et al., 2007). Other studies have shown a relationship between compliance with yearly eye exams and lack of education related to diabetic retinopathy (Van Eijk, Blom, Gussekloo, Polak & Groeneveld, 2011; Gazmararian et al., 2009; Nam, Chelsa, Stotts, Kroon & Janson, 2011; Jones, Walker, Schechter & Blanco, 2010; Sloan, Yashkin & Chen, 2014; Brunisholz et al., 2014). Finally, studies have revealed that minimal or no support from healthcare provider-provider relationship negatively affects the compliance of diabetic retinopathy screening exams (Williams et al., 2009; Lindenmyer et al., 2014; Nam et al., 2010; Gherman et al., 2011; see Appendices B for synthesis of evidence table).

Lack of Access

Lack of access is a common barrier to the nonadherence of eye screening exams. The largest single problematic issue related to nonadherence is transportation including inability to afford or locate transportation (Lindenmeyer et al., 2014). Barriers to nonadherence can also be associated with sociodemographic factors, health insurance coverage, medication, visual impairment, and geographic accessibility to an ophthalmologist (Chou et al., 2014; Dorsey et al., 2007; MacLennan et al., 2014; Creuzot-Garcher et al., 2010).

A major issue in diabetic retinopathy control is providing resources for individuals who may or may not have signs of vision impairment (Hatef et al., 2015). Hatef et al. (2015) examined performance rates of managed care organizations annual diabetic eye screening in the Medicaid population and identified barriers. The evidence showed that 46% (n=1736) in 2010 and 64% (n=3261) in 2012 completed an annual eye exam supporting that a higher compliance rate is associated with increased access (Hatef et al., 2015). The increase in completed exams was likely due to incentives offered to the primary care offices for implementing the a nonmydriatic fundus camera during the patient's visit in the primary care clinic (Hatef et al., 2015). The creation of same day eye exam appointments would improve attendance rates since patients are already at the primary care provider's office (Gower et al., 2013).

Duration of Disease

Among studies that measured compliance barriers, patients who are older in age, experience prolonged duration of diabetes, have poorer vision, or have an increase in the severity of their retinopathy show a positive relationship with compliance of eye screening exams along with follow-up of their eye disease (Saadine et al., 2008). Prior studies revealed consistent results by showing a direct relationship with the duration of diabetes and eye exam adherence, and the age range most at risk for noncompliance with eye exams is ages 18-35 (Sheppler et al., 2014; MacLennan et al., 2014).

Lack of Education

Initially eye involvement in diabetes is essentially symptom free; therefore, patients may not understand that annual eye examination are essential (Creuzot-Garsher et al., 2010). Van Eijk et al. (2011) revealed that decreased awareness about the damaging effects of diabetic retinopathy on visual acuity, anxiety over the results of the eye screening exam, and perceived

lack of usefulness at patients' age (patients aged ≥ 70 years) influenced obtaining an eye examination. Denial is also a key factor that inhibits adherence whether related to prevention of complication or self-management of the disease (Gazamrarian et al., 2009). Evidence indicates that patients failed to believe that consequences will happen and that patients expressed confusion about education material content (Gazamrarian et al., 2009).

The reviewed studies indicated that common barriers individuals might have in relation to diabetes management include misconceptions regarding the seriousness of the disease, lack of understanding about the disease and possible complications; these barriers can contribute to patients not obtaining proper screening for diabetic complications such as diabetic retinopathy (Nam et al., 2010). Sloan et al. (2014) explored the gaps in receipt of regular eye exam, and the findings supported the claim that lack of patient's knowledge in regards to monitoring by eye care professional is critical to patients receiving annual eye exams, even prior to diabetes-related eye complication diagnosis.

Brunisholz et al. (2014) conducted a study on diabetic education and found that standardized Diabetic Self-Management Education (DSME) is strongly associated with improving diabetes outcomes and increasing adherence. Similar studies have supported this evidence showing that time spent participating in diabetic education activities increased the likeliness of patients obtaining a diabetic eye screening exam (Jones et al., 2010). Also, clinician factors may contribute to the decrease in compliance of eye exams. Factors include the failure to follow evidence-based treatment guidelines, beliefs, knowledge and attitudes, communication and patient-clinician interactions (Nam et al., 2010).

Patient-Clinician Relationship

Patient-clinician relationships are built through communication and trust. Patients and clinicians differ significantly in their awareness, knowledge, and attitudes, which may lead to conflict, decreased clarity, and poor outcomes (Nam et al., 2010). In a systematic review, Nam et al. (2010) found that patient's disease perceptions are influenced by their healthcare provider. Unfortunately, many patients report challenging obstacles associated with the provider such as lack of adequate communication, tools, and skills on counseling and decision-making on effective treatment which are factors associated with poor compliance (Nam et al., 2010).

Gherman et al. (2011) performed a meta-analysis which investigated the relationship between knowledge related to diabetes and adherence to diabetic regimens and discovered that a higher level of knowledge related to increased adherence to diabetes regimens (Gherman et al., 2011). In another study which explored factors that contribute to patient retinopathy screening, results showed that communication between practice staff, as well as screeners and patients, staff perceptions of non-attenders, and medical staff communication influence adherence to diabetic eye screening exams (Lindenmeyer et al., 2014).

Nonadherence regimens are complicated and involve relationships among patient, health care clinicians, and community (Williams et al., 2009). A study, which applied the self-determination theory (SDT) to predict adherence and outcomes in diabetic patients confirmed that the perception of the ability to act independently in the management of their own diabetes care from the health care provider was positively associated with the self-regulation of medication use and competence for self-management (Williams et al., 2009). Studies suggest that the effective use of tools such as time, resources, training, feedback and incentives to enhance the use of evidence-based guidelines leads to the ability to improve clinicians'

communication skills and ultimately patients' health outcomes (Nam et al., 2011). At this time studies have examined reasons for noncompliance rather than how to increase the compliance of yearly eye exams.

Theory

Beliefs can be strongly associated with adherence. The model that was utilized for this DNP project was the Health Belief Model (HBM; Hochbaum, Rosenstock & Kegels, 1952). This theory addresses problem behavior that evokes health concerns (Glanz, Burke & Rimer, 2014). The six main constructs of HBM include perceived susceptibility, perceived severity, perceived benefit, perceived barriers, cue to action and self-efficacy (Glanz, 2014). Gherman, et al (2011) measured individual beliefs, and perceptions, related to diabetes and the association between cognitive factors and blood glucose levels or other adherence behaviors. The results showed that self-efficacy, patient's trust and confidence in their health care provider, and the perceived consequences related to their choices are strongly associated with adherence (Gherman et al., 2011).

HBM can be a useful tool when developing strategies that apply to noncompliance situations (Glanz, 2014). Patients must believe that the advised treatment and/or screening guidelines will reduce their risk without negative outcomes or excessive difficulty (Glanz, 2014). The education created for this DNP project addressed the issue of noncompliance by increasing patient's knowledge about disease process and preventative measures targeted toward diabetic retinopathy along with the importance of regular screening eye exams in the prevention of vision loss (see Appendices C for theory to application diagram).

IRB Approval, Site Approval, Ethical Issues and Funding

The University of Kansas Health System Institutional Review Board deemed this project as quality improvement. A site agreement was obtained through the project site clinic. As a student investigator and provider at the clinic, there was not a conflict of interest of as the results of this study can be applied to a different clinic. The voluntary participation process included an information letter describing the project and asking the individual to participate in the project. Confidentiality was maintained by assignment of a code to each participant. Patient demographics of name, age, date of birth and ethnicity were entered into RedCap. Funding for this project included volunteered time and the student investigator sought small grants through the American Association of Nurse Practitioners (AANP), American Diabetes Association (ADA), and National Institute of Diabetes and Digestive and Kidney Disease (NIDDK; see Appendices D for cost table of this project, Appendices E for project timeline).

Setting and Participants

The setting for this project was an established family practice clinic that is in an underserved community in Kansas City, Kansas providing healthcare to over 2,000 patients per year. The number of participants for this project was 30-40 patients in the intervention group. The sampling method for the intervention group was consecutive sampling. The collaborating physician and the student investigator performed a computer generated chart audit for patients with type 2 diabetes using ICD-10 code E11.9. Inclusion criteria for this project included patients with the diagnosis of type 2 diabetes, age range of 18-80 years of age, and no eye screening exam within in the past two years documented in the electronic medical record. Exclusion criteria included individuals with the diagnosis of type 1 diabetes, under the age of 18 and over the age of 80, eye screening within the last year, and non-English or non-Hispanic

speaking patients. The control group data, which addressed diabetes and eye care, was obtained from retrospective data made available quarterly through the University of Kansas Health System.

Evidence-Based Intervention

Gazmararian et al. (2009), utilized focus groups to discover both barriers and opportunities for improving the care and management of diabetes in the underserved population. Similar studies discovered that patients often forget about their appointments for yearly eye exam or feel the exam is not necessary because of the absence of vision symptoms (Chou et al., 2013; Gower et al., 2009). The intervention for this DNP project included diabetic retinopathy education in conjunction with a reminder/screening card. The education included the disease process, treatment, and prevention of the disease. The education booklet, *Diabetic Eye Disease An Educator's Guide*, which consists of information related to diabetic retinopathy, was provided by the United States Department of Health and Human Services Nation Eye Institute (National Eye Institute, 2005; see Appendices F for education material).

The intervention began with the recruitment process. During a one week period the student investigator who is an APRN met with her collaborative physician and performed a computer generated chart audit using ICD-10 code E11.9 via the collaborative physician's patient panel. A range of 30-40 patients by consecutive sampling was selected from clients with a clinic appointment during between September-December 2016, taking into consideration both inclusion and exclusion factors. Each potential participant was provided with an informational letter discussing the project and asking if they would like to participate in this project. Participants were assigned a code number after consent was obtained, and then the student investigator collected demographic data including age, gender, date of birth, and ethnicity.

The second phase of this intervention was the application of the intervention. In the application process each participant was asked to complete eight true or false questions related to the individual's knowledge about diabetic eye disease prior to the education intervention. Next, the participants received an individual education booklet related to diabetic retinopathy during the clinic visit. The student investigator provided education to each individual participant during their regular scheduled clinic visit. The participants were then asked to complete the questionnaire again along with two new questions that assessed their readiness to make an eye screening appointment. If participants revealed they were not ready to make an eye appointment, they were directed to the next question asking for a reason why they were not ready to make the appointment. Participants that expressed readiness to make an appointment were given the postcard and instructions. Participants were instructed to make and obtain their eye screening exam within six weeks from the initial clinic visit and that the eye care specialist must sign the back of the card. Data was collected over a 4 month period. Finally, using the statistical data program SPSS, an analysis will be performed

The final step was to retrieve retrospective data from the previous quarter prior to the quality improvement intervention on the compliance rates for diabetic eye screening exams at the clinic site. This data is performed quarterly through chart audits by the University of Kansas Health System for outcome compliance related to patient centered medical home standards. This aggregate de-identified data is made accessible to providers and discussed at quarterly meetings that focus on patient improvement. Finally, the retrospective non-intervention data on eye screening rates was compared to the intervention group data (see Appendices G for logic model and H for intervention diagram).

Change Model

The change theory that supported this DNP project is the Transtheoretical Model of Behavior Change (Prochaska & DiClemente, 1983). This theory is used to assist in understanding individual's progression toward establishing and managing health behavior change for maximum health (Gillespie & Lenz, 2011). The theory suggests that health behavior change can be strengthened by advancing knowledge and confidence, growing patient's individual skills and competence, and improving social facilitation (Ryan, 2009). The key to the use of this theory in a practice setting is to evaluate the individual's phase and then inform and encourage the patient to advance forward to the action, maintenance and termination stages (Gillespie & Lenz, 2011).

The EBP framework used for this project is the Model for Evidence-Based Practice Change (Rosswurm & Larrabee, 1999). This model integrates principles of quality improvement, use of team working tools and evidence-based translation strategies to promote adoption of a new practice (Melnyk & Fineout-Overholt, 2015). Locating the best evidence, analyzing the evidence, designing a practice change, and applying and assessing the change are the keys steps to this model (Melnyk & Fineout-Overholt, 2015). Evidence supports that individuals are not obtaining regular yearly eye screening exams due to lack of knowledge about the disease. This DNP project focused on education, and successes can be applied to everyday practice and other chronic disease.

Study Design

The study design for this project was a quasi-experimental design, pre-post knowledge within the prospective intervention group and post only eye care exam completion between the intervention group and retrospective control group. The participants for the intervention group

were obtained through consecutive sampling. The independent variable was the education with the screening cards, and the measured outcome was the impact on patients obtaining their eye screening exam and knowledge of diabetic retinopathy.

Validity

The aspect in the project that promotes internal validity is that the educational material provided follows recommended guidelines for diabetic eye care from the American Diabetes Association, National Eye Institute and American Academy of Ophthalmology Retina/Vitreous Panel. The diabetic retinopathy knowledge test that was used as a secondary measure does not have established reliability in assessing patient's knowledge, but content does have validity as the test was created from the National Eye Institute (National Eye Institute, 2000). External validity is promoted in this project by using a sample of type 2 diabetic ranging in ages 18-80 years of age although generalization may be limited due to exclusion of patients who are noncompliant with their yearly diabetic eye exam.

Measured Outcomes

In this DNP project the primary outcome measured was the increase in compliance rates of screening eye exams. This was measured by the amount of returned screening cards to the clinic and was compared to the retrospective data. A secondary outcome measured was the participant's knowledge and was compared pre- and post-education within the intervention group by using a diabetic retinopathy knowledge test.

Measurement Instruments

The first instrument of measurement was the screening card. The screening card is a self-addressed, self-stamped postcard that each participant received after the education intervention was completed. This measurement was obtained in the amount of cards that were signed by the

eye care specialist and returned to the clinic. This measurement assisted in the validation of the impact of the intervention on eye screening exam. One weakness to this tool was that a patient may have completed their eye exam, but the screening card may not be returned, or screening card may have been lost. Also, participants may have forgotten to have the card signed by their eye care specialist during their eye exam.

The second instrument that was used for this DNP project was questions obtained from the diabetic retinopathy knowledge test. The test was developed by the National Eye Institute to assess diabetic eye disease knowledge, and the institute has granted permission for use and reconfiguration of the questionnaire. This test otherwise known as “*Eye-Q Test*” is a 10 true/false questionnaire to assess an individual’s knowledge of diabetic retinopathy and eye disease (National Eye Institute, 2000). For the purpose of this project, two questions were omitted from the pre- and post-test. Two questions were added to the post-test addressing the participant’s readiness to schedule an eye exam. If participant answered *no* to the readiness question, then he/she was directed to the next question asking *why*. This measurement may help identify barriers on reasons patients may not obtain their yearly eye exam. (See Appendices I, and J for pre- and post-test and K for permission for use).

Quality of Data

This DNP project was a pilot study. The sample size was predicted to be 30-40 participants. A retrospective group provided baseline data on eye screening exam rate which was compared to the post data of the intervention group. Baseline knowledge and change were determined within the prospective intervention group. Post education diabetic retinopathy knowledge test results and outcomes were compared to other results from existing studies (Gazmararian et al., 2009; Brunisholz et al, 2014.; Van Eijk et al., 2012) that utilized education

to increase compliance in diabetic outcomes. If the sample size was greater than 30, then a post-hoc power analysis was to be conducted using .8 power, medium effect, and alpha 0.5.

Analysis Plan

Primary data obtained from the return of the screening cards were imported into IBM SPSS Version 24 and analyzed using a percentage proportion test. Secondary data collection from the pre- and post- *Eye-Q* test were analyzed using a Pearson Chi-square. Descriptive data on participant's age, gender, and ethnicity was computed in frequencies and percentages on only the intervention group. Retrospective data had already been computed into percentages based on monthly and quarterly data per the University of Kansas Health System (See Appendices L for data collection table, and M for statistical analysis table).

Results

Setting & Participation

The setting for this DNP project was a family practice clinic in Kansas City, Kansas which provides care to an underserved population. The participant sample in the intervention group consisted of 13 patients with a diagnosis of Type 2 Diabetes who have not received an eye exam in the past year. The sample was comprised of four males and nine females with ages ranging from 37-88, and a mean age of 60. The sample also included seven Caucasian and six African-Americans participants. The verbal reminder sample consisted of the entire patient panel at State Avenue Health Care minus the thirteen participants from the study diagnosed with type 2 diabetes. The sample included different ethnicities such as Caucasian, African-American, Hispanic, Nepalian, and Arabic. The timeframe was four months starting in mid-August 2016 with the completion January 2017. The timeframe allowed participants to schedule and complete a diabetic eye exam.

Intervention Course

This quality improvement project began mid-August 2016 with a computer generated patient list identifying all patients at the family practice clinic with the diagnosis of Type 2 diabetes. Next, a chart audit was then performed identifying which of those patients have not received a diabetic eye screening exam in the past year. A list was created of possible participants, thirty patients were selected, and letters were sent out to the potential participants. The letter included a description of the quality improvement study, asked if they would like to participate, and included when each participant needed to schedule their next diabetic follow up appointment. In early September 2016, participants started scheduling their three month diabetic follow up appointment.

During their appointment, participants were administered eight true/false questions as a pre-test assessing each individual's knowledge about diabetic retinopathy. Next, diabetic retinopathy education was provided by the investigator after the physician completed his/her portion of the clinic visit. Participants were asked to retake the same test to assess if there was any change in their knowledge regarding diabetic retinopathy. Two questions were added to the post-test asking if the participant was ready to schedule their eye exam and if not then what barrier is keeping them from scheduling the appointment. After completion of the post-test participants were handed a postcard with instructions to schedule their own diabetic eye screening exam and have their eye care specialist sign the card. Patients were instructed to return the card within four to six weeks from the initial diabetic follow up appointment. The final participant was seen December 5, 2016 and was given until January 16, 2017 to return the screening postcard.

Data Results

The educational intervention did not meet the goal of increasing the compliance rates of diabetic eye screening exams over a four month period. The results revealed that 30.8% (N=13) of the participants returned the screening cards and received diabetic eye screening exams over a 4 month period. The nonintervention group, or verbal reminders, found that 31.5% (N=127) of patients received diabetic eye screening exam per The University of Kansas Health System Quality Report over a four month period.

A Chi-Square of independence was performed using a Fisher's Exact test and McNemar's test to examine the relationship between the education intervention and an increase in participant's knowledge. The Fisher Exact test, independent groups, revealed that there was no significance difference ($p \geq .05$) between the pre- and post-test knowledge test. Question three which addressed if patients with diabetes should have yearly eye exams, and question six which addressed if patients with diabetes should have regular eye exams through dilated pupils were approaching significance ($p=.015$, $p=0.15$, respectively) showing a possible relationship between education intervention and an increase in participant knowledge (National Eye Institute, 2000). The McNemar test results, paired pre- and post-test revealed a significant change from pre- to post-test ($p=.016$) for question five which addresses if laser surgery can be used to halt the progression of diabetic retinopathy and the remaining questions showed no significance. Question two which addresses if diabetic eye disease usually has early warning signs, question four which addresses if diabetic retinopathy is caused by changes in the blood vessels in the eye, and question seven which addresses if people who have good control of their diabetes are not at high risk for diabetic eye disease, showed results approaching significance showing a relationship between the education intervention, and increased participant knowledge (National

Eye Institute, 2000; see Appendices N for Data results table, O for Fisher Exact test table, and P for McNemar test table).

Discussion

Several successes of the intervention were shown in this study. One of the most important successes was that the study brought awareness to the lack of patient knowledge about diabetes related complications. Patients understand that they are at risk for developing complications related to diabetes with uncontrolled blood sugars, but not an understanding that the longer the duration of the disease, whether controlled or uncontrolled, then the greater the risk of developing diabetic retinopathy and vision loss. Patients also became aware through the education intervention that early detection is important as there are no warning signs related to vision loss. The expression the investigator always received from patients when presenting page five in the *Diabetic Eye Disease An Educator's Guide* was the same, "Wow I did not know that!" That specific page represented how vision loss would appear without early detection and early treatment of retinopathy, and emphasized that damage may be present before an individual sees the actual vision changes. The investigator assumed that bringing awareness about the vision complications would motivate individuals to become compliant with yearly eye screening exams.

The setting for this study was Wyandotte County, Kansas which has an average population of 158,348 with a median household income of \$39,042 (Mid-America Regional Council, 2013). In this county 48.5% of individuals live at or below 200% of the federal poverty level and only 33% of the county's population has obtained only a high school education (Mid-America Regional Council, 2013). The percentage of individuals living in Wyandotte County with diabetes is 28.1%, and access to primary care is one primary care provider per 1,829 patients (Mid-America Regional Council, 2013).

The University of Kansas Health System, along with the collaborating physician and clinic staff understand that this is an underserved population, and were supportive in increasing the awareness of diabetic retinopathy and vision effects. Support was also provided by the National Eye Institute for providing the education material and granting permission for the use of their *Eye-Q* test. The clinic staff ensured that each participant completed the pre- and post-test, along with re-enforcing the instructions for the screening card. Clinic staff also provided extra time during each participant's appointment to accommodate the education intervention, and not to interfere with the provider's other scheduled patients. Without the support from each of these organizations this quality improvement study would not have been successful.

Results Compared to Evidence

Although there has not been any published quality improvement studies that evaluate screening cards to improve compliance, there have been numerous studies that addressed the lack of education to support the noncompliance of yearly eye screening exams. Jones et al. (2010) conducted a study which used a telephone intervention to increase the rates of diabetic retinopathy screening exams. Participants obtained a customized education intervention from experienced health educators in either English or Spanish (Jones et al., 2010). The results revealed that as time spent participating in educational activities increased, the likelihood of participants receiving the eyes exam would increase (Jones et al., 2010).

Another study which supported the current educational intervention was performed by Gazmararian, Ziemer, and Barnes (2009). This study explored individual educational along with obstacles that limit low-income diabetic patients' ability to accomplish optimal diabetes self-management. The study had a total of 35 diabetic patients that participated in focus groups that discussed knowledge of diabetes and self-management (Gazmararian et al., 2009). The results

supported educational barriers such as failure to recognize the risk and consequences of asymptomatic conditions and system barriers including follow up, refresher courses, and availability of different education modalities inhibit one's ability to achieve optimal diabetic self-management (Gazararian et al., 2009). Other studies from Sloan et al. (2014) and Nam et al. (2010) supported the need for continued education, and that there is a lack of patient knowledge and understanding in relationship to diabetic complication and asymptomatic presentation.

Limitations

Validity

The internal validity for the evidence-based practice project was fostered by valid education material from the Nation Eye Institute and a pre- and post-test. This material did not negatively affect the outcome of this study as the material aligned with the recommended guidelines from the American Diabetes Association. External validity was promoted by using only type 2 Diabetics with ages ranging from 18-80. Many of the participants were older, with a mean age of 60 which decrease generalization to younger age. Also, obtaining a yearly exam is the same for type 1 diabetics but the duration on obtaining the initial eye exam differs from that of a type 2 diabetic.

Sustainability

Over time, there is potential for this evidence-based practice intervention to weaken. Many individuals will have retained the information regarding diabetic retinopathy and become exhausted from receiving repeated information leading patients to canceling or missing clinic follow up appointments. There are numerous approaches to maintaining improvement from this intervention such as selecting one appointment a year that will focus on refreshing the patient knowledge about diabetic retinopathy and submitting a referral to the eye specialist for the exam.

Limitations Minimized

There were many efforts to minimize limitation impacts on the application of results. Large pools of participants were selected to minimize a small sample size. The intervention was performed during the participant's diabetic follow up clinic appointment to allow convenience for the participants. Medical staff also rescheduled appointments that participants missed within a 14 day period.

A limitation that evolved during this intervention was the small sample size. Other challenges that were endured during the intervention included participants missing scheduled follow up appointments due to weather concerns, insurance issues, or transportation issues. The effect of the limitations on the interpretation and application of the findings was major. There was a small return rate for the screening cards which affected the findings. Also, even though there was an increase in the knowledge related to diabetic retinopathy, the finding was statically insignificant, most likely due to the small sample size.

Interpretation**Expected and Actual Outcomes**

There were numerous expected and unexpected results for this study. The investigator's expected results of 100% participation and 90% screening card return was not observed, rather a decrease in participation of 30.8% (N=13), and a decrease in the return of screening card was observed. The investigator expected to see improvement in knowledge related to diabetic retinopathy and this impact was observed in several questions, but due to the small sample size the results were not statistically significant. Many issues occurred throughout this study such as patients agreeing to participant but never attempting to make their scheduled follow up appointments for diabetes regardless of several contact attempts by the medical staff. Also,

many participants would “no show” to their scheduled appointments and medical staff were unable to contact them to reschedule. Weather and illness also played a factor to participants attending their scheduled diabetes exam.

There are various reasons that may account for the difference between the observed and expected outcome. For example, with the screening cards, individuals may have misplaced the screening card, or forgotten to bring the card to the eye examination for their physician to sign. Participants also may have failed to remember to scheduled their eye exam within the timeframe given or scheduled the eye exam at all due to finances.

Intervention Revision

This intervention had strengths such as an isolated population with an ability to follow the participants throughout the process from recruitment to pre-test/post-test. Other strengths included time allotted during the clinic visit to complete the education intervention and allow for participant questions and participant being able to obtain a follow up appointment in a timely manner. Weakness that interfered with the strength of this study was that referrals for the eye examination were made outside of the hospital system, and made by the patient rather than the medical staff therefore the study depended heavily on the motivation and health literacy of each participant.

Intervention Revision

The investigator discovered that this intervention may be more successful in a primary care setting located in either a suburban or urban setting where patients might have a higher baseline education level and an increase in motivation for either prevention or self-care management of chronic disease. Intervention modifications that might improve the outcomes of

this study would be to refer through the hospital system and use the referral letter from the eye care specialist.

Intervention Cost

The estimated cost for this study was \$6,786.60 based on material and staffing. The actual cost of this study was \$15.50 for the screening postcard. Education material and testing questions were donated by the National Eye Institute, the SPSS software was donated through the University Of Missouri Kansas City School Of Nursing and the collaborating physician and medical staff volunteered their time for this project. No funding resources were used for this project.

The impact of this evidence-based project can have an immense effect on healthcare cost and healthcare policy. The annual cost for diabetes related vision lost is estimated at \$500 million dollars (CDC 2015) related to patients presenting for eye care late in the disease process due to the delay in the diagnosis of diabetes, or lack of symptom presentation. This evidence-based intervention will increase awareness to the lack of symptom presentation with diabetic retinopathy and foster increasing screening rates, and in turn decreasing healthcare cost. The sustainability for this evidence-based intervention is relative inexpensive as it would entail a yearly refresher course of the education material at a follow-up clinic appointment, and also making the referral to the eye care specialist. This evidence-based intervention can also be applied to other chronic disease to assist in improving self-management.

Conclusion

Despite the progression in the diagnosis and treatment of diabetes, management is a continuing process for both the patient and clinician (Nam et al., 2010). The level of awareness in relation to diabetes and ocular complications is low especially in individuals newly diagnosed

with diabetes, and no family history of diabetes (Munoz et al., 2008). Knowledge is imperative for patients diagnosed with diabetes to make effective and appropriate self-care decisions (Garcia, Villagomez, Brown, Kouzekanani & Hanis, 2001). Education is the cornerstone to increasing compliance.

The evidence-based practice education intervention on diabetic retinopathy in this project provides diabetic patients with information that will assist them in their disease management of vision complications and preventative measures. This will allow patients to understand that vision symptoms are not always present and to lessen the fear of obtaining an eye exam. The application of positive Eye-Q test findings can assist healthcare providers in the family practice clinic in addressing each patient's lack of knowledge in a specific care and tailor diabetes self-management education to the individual patients. If this intervention had been successful in increasing compliance rates in patients obtaining eye screening exams, then this intervention could applied to other clinics with decreased eye screening compliance in patients with diabetes.

The dissemination plan for this project is to present this project as a poster presentation at the American Academy of Nurse Practitioners (AANP) National Conference June 2017. The project poster was submitted to the AANP committee March 2017 and was approved for the poster presentation March 2017. This project will assist other providers in assessing the needs of each individual patient to successfully manage chronic disease, or give others ideas on how to improve compliance rates. This project will provide the foundation to assist in the improvement of overall quality of health and reduce healthcare cost in the future.

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Appendix A

Definition of Terms

Blood Glucose: body's primary source of energy, principal sugar found in the body (American Diabetes Association [ADA], 2016).

Diabetic Retinopathy: a extremely specific vascular complication of both type 1 and type 2 diabetes strongly related to both the duration of diabetes and the level of glycemic control (American Diabetes Association [ADA], 2016).

Type 2 Diabetes: is a problem with your body that causes blood glucose level to rise higher than normal and your body does not use the insulin properly (American Diabetes Association [ADA], 2016).

Appendix B

Synthesis of Evidence Table

Author, Year, Title, Journal	Design, Evidence level	Participants, Sampling , Setting	Intervention or Procedure	Outcome measures, findings	Limitations, Strengths
Dorsey, R., Songer, T., Zgibor, J., Kelsey, S., Ibrahim, S & Orchard, T. (2007) Does patient behavior or access factors have the largest influence on screening in type 1 diabetes? Diabetes Care	<p>Design</p> <p>Cohort study, chart review</p> <p>Level of Evidence</p> <p>4</p>	393 subjects from 1998-2001, 324 subjects from 2002-2006	<p>Access and patients behavior between 1998-2001</p> <p>Screening practices observed in 2002-2006</p>	<p>Outcome Measure</p> <p>Examine accesses to care and behavior of patients to predict screening practices.</p> <p>Findings</p> <p>Strong predictors of screening use associated with:</p> <ul style="list-style-type: none"> -access to care -care visits with specialist -amount of doctor visits -insulin therapy <p>Screening test shows positive association with daily glucose testing</p>	<p>Limitations</p> <p>subject to recall bias due to self-reporting data</p> <p>Selection bias as all respondents are involved in another study</p>
Taylor, C.R., Merin, L.M., Salunga, A.M., Hepworth, J.T., Crutcher, T.D., O’Day, D.M. & Pilon, B.A. (2007) Improving diabetic retinopathy screening ratios using telemedicine-based digital retinal imaging	<p>Design:</p> <p>retrospective cohort study</p> <p>Evidence Level:</p> <p>4</p>	495 patients with diabetes ≥18 years old seen at a community health clinic between 9/03 and 8/04	Pt offered either to have an ophthalmology referral (scheduled within 3 months of appointment) or a digital retinal screening during visit.	<p>Objective Measures:</p> <p>To examine impact of digital retinal imaging use in eye screening rates in primary care clinic in an urban setting.</p>	<p>Limitations:</p> <p>Lack of comparison group</p> <p>Sensitivity and specificity ranged between 80%-100% for detection of DR with use of digital imaging</p>

<p>technology Diabetes Care</p>				<p>Findings: Screening rates improved when done in clinic.</p>	<p>Usefulness: Technology can improve access to healthcare</p>
<p>Jones, H.L., Walker, E.A., Schechter, C.B. & Blanco, E. (2008) Vision is precious a successful behavioral intervention to increase the rate of screening for diabetic retinopathy for inner-city adults The Diabetes Educator</p>	<p>Design: randomized control study using telephone intervention Qualitative study Evidence Level: 2</p>	<p>305 participants who received the intervention from trained health educators living in the New York area</p>	<p>Patients in telephone group receive the intervention from trained health educators</p>	<p>Objective Measures: Examine use of a telephone intervention to increase DR screening rates over a 6 month period. Findings: -no association with building rapport and screening exam -education activities increased screening exam -no ethnic association -if no screening exam associated with increased behavioral process</p>	<p>Limitations: Rapport with patient, reliability of self-reporting Usefulness: specific health education is necessary for behavior change</p>
<p>Saadine, J.B., Fong, D.S. & Yao, J. (2008) Factors associated with follow up eye examinations among persons with diabetes Retina</p>	<p>Design-Chart review Cohort study Evidence level: 4</p>	<p>2414 patients randomly identified that had eye exam during study enrollment period</p>	<p>Medical record review of screening eye exam</p>	<p>Outcome Measurement: Determine the frequency of follow-up exams Findings: Likely to follow up in 1 yr due to : -increased age -poorer vision -more severe retinopathy</p>	<p>Limitations: Chart review design-only documentation of retinopathy status is charts Health literacy</p>

<p>Williams, G.C., Patrick, H., Niemiec, C.P., Williams, L.K., Divine, G., Lafata, J.E.,... Pladevall, M. (2009) Reducing the health risk of diabetes How self-determination theory may help improve medication adherence and quality of life The Diabetes Educator</p>	<p>Design- Questionnaire, survey, claims-based reports, self-reporting, chart review (lab values), cross-sectional</p> <p>Quantitative</p> <p>Evidence Level: 4</p>	<p>2973 patients diagnosed with diabetes obtaining care from an health care system over a 1 year period</p>	<p>Response to mail and telephone survey assessing provider support</p>	<p>Outcome Measures:</p> <p>The application of the self-determination theory (SDT) to examine quality of life, adherence to medication, and mental health outcomes in patients with diabetes.</p> <p>Findings:</p> <p>Provider’s view and support on patient’s independence has a positive relationship with self-management and patient regulation of medication use</p> <p>Patient proficiency increases quality of life and adherence to medication</p>	<p>Limitations:</p> <ul style="list-style-type: none"> -data collected over narrow time period -did not test specific behaviors -people who had never filled prescription or obtained lab values were excluded -motivational variables were restricted
<p>Gazmararian, J.A., Ziemer, D.C. & Barnes, C. (2009) Perceptions of barriers to self-care management among diabetic patients The Diabetes Educator</p>	<p>Design: Design: Qualitative research use of focus groups</p> <p>Evidence Level:</p>	<p>35 diabetic patients participated in a focus group</p>	<p>Focus groups were created to assist in the identification examination and understanding about personal beliefs, motivations, skills</p>	<p>Outcome Measures:</p> <p>To explore education and obstacles that decrease ideal diabetes self-management in low income people.</p> <p>Findings:</p> <p>-Emotional toll from the diagnosis and lifestyle</p>	<p>Strengths:</p> <ul style="list-style-type: none"> -Good participation -discussion format comfortable -participants willing and able to express opinion

	6		and practices.	<p>changes to treat diabetes</p> <ul style="list-style-type: none"> -stress -irritation -isolation socially -interpersonal conflicts -Depression/ fear -Denial <p>Other system barriers:</p> <ul style="list-style-type: none"> -follow-up -reeducation -support group -nutrition -medication education -expanded clinic hours -availability of different education modalities 	<p>Limitations:</p> <ul style="list-style-type: none"> -small group of participants -potential bias in selection -limited generalizability of the results <p>Usefulness:</p> <p>Provide information regarding barriers to management of diabetes</p>
<p>Creuzot-Garcher , C., Malvitte, L., Sicard, A.C., Guillaubey, A., Charles, A., Beiss, J.N. & Bron, A. (2010) How to improve screening for diabetic retinopathy: the burgundy experience Diabetes and Metabolism</p>	<p>Design:</p> <p>Cross-sectional</p> <p>Quantitative study</p> <p>Evidence Level:</p> <p>4</p>	<p>676-diabetic patients in 2005 and 1298 diabetic patients in 2006</p>	<p>A mobile screening campaign was created in areas defined by the Regional Health Agency. Patients filled out a questionnaire and then given a letter encouraging regular yearly follow-ups and see if rates increased.</p>	<p>Outcome Measures:</p> <p>To evaluate impact of mobile retinopathy screening program on follow up.</p> <p>Findings:</p> <ul style="list-style-type: none"> -Overall rates of ophthalmology did not increase from 2005-2006, vs screening campaign -Rates did not increase for 	<p>Limitations:</p> <ul style="list-style-type: none"> -did not include diabetic patients who are not treated or those using insulin <p>Usefulness</p> <ul style="list-style-type: none"> -need to improve awareness about importance of eye exam -encourage involvement with PCP

				ophthalmology visits Screening campaign showed improvement in management in DM as 80% of screened with diabetic retinopathy consulted ophthalmologist	
Nam, S., Chesla, C., Stotts, N.A., Kroon, L. & Janson, S.L. (2010) Barriers to diabetes management: patient and provider factors Diabetes Research and Clinical Practice	Design: systematic review using cross-sectional studies, randomized clinical trials, observational studies and qualitative studies Evidence Level: 5	N/A	N/A	Objective Measures: To identify and understand barriers to adherence to diabetes self-management and provider interventions to improve management and care of diabetes. Findings: Several patient factors that influence care: -compliance -beliefs -opinion -awareness -ethnicity/culture -language -finances -social support -co-morbidities Adherence factors influenced by: -beliefs -financial resources	Usefulness: Assist in the creation of further research that is directed toward outcomes.

				<p>-thoughts about disease</p> <p>Provider factors:</p> <ul style="list-style-type: none"> -failure to follow evidence-based guidelines -thoughts and opinions -interactions -knowledge 	
<p>Eijk, K.N.D., Blom, J.W., Gussekloo, J., Polak, B.C.P. & Groeneveld, Y. (2011) Diabetic retinopathy screening in patients with diabetes mellitus on primary care: incentives and barriers to screening attendance Diabetes Research and Clinical Practice</p>	<p>Design-Focus group and questionnaire</p> <p>Quantitative part- questionnaire sent to patients or if no response telephone</p> <p>Qualitative part- 4 focus groups comprised of 5 patients</p> <p>Cross-sectional design</p> <p>Evidence Level: 4 & 5</p>	<p>3241 Dutch patients in 20 general practice setting</p>	<p>Pt were asked to fill out a questionnaire about barriers to eye exam</p> <p>Focus groups were to discuss potential barriers and incentives from interviews</p>	<p>Outcome Measures: To identify incentives and barriers to attend DR-screening</p> <p>Findings: Pt not having exams: -decreased education -recent DM diagnosis -less insulin usage</p> <p>Incentives: -“fear of impaired vision” -“knowledge” -“Sense of duty”</p> <p>Main barrier -not recommendation from PCP.</p>	<p>Limitations :Attendance may have been overestimated Study population large, high response rate due to broad definition of attendance (eye exam within 3 years) Based on current opinion</p>

<p>Gherman, A., Schnur, J., Montgomery, G., Sassu, R., Veresi, I. & David, D. (2011) How are adherent people more likely to think? A meta-analysis of health beliefs and diabetes self-care The Diabetes Educator</p>	<p>Design: Systematic Review, Meta-analysis</p> <p>Evidence Level: 5</p>	<p>N/A</p>	<p>Measurement of beliefs, perceptions or knowledge about diabetes in relation to glucose levels, adherence and cognitive factors</p>	<p>Objective Measures: Examine the relationship between beliefs related to diabetes and compliance to diabetes management.</p> <p>Findings: Strong adherence is associated with a perceived trust and confidence in provider, self-efficacy and consequence of choices</p>	<p>Limitations: -only studies available through specific databases -articles written in English were included -limited study on gestational diabetes -focus was on adults -no standard measurement of diabetic beliefs</p>
<p>Gower, E.W., Silverman, E., Cassard, S.D., Williams, S.K., Baldonado, K. & Friedman, D.S. (2013) Barriers to attending an eye examination after vision screening referral within a vulnerable population Journal of Health Care for the Poor and Underserved</p>	<p>Design: telephone-based questionnaire</p> <p>Quantitative study</p> <p>Evidence Level: 4</p>	<p>2,915 individuals from a Physicians Free Clinic funded by Columbus Medical Association Foundation</p> <p>Pt must have 20/50 in one eye with hx of DM, glaucoma, eye problem or worsening vision in past year</p>	<p>Telephone questionnaires were conducted between April and August 2011 by a trained interviewer.</p> <p>-participants asked if interested in free eye exam</p>	<p>Outcome Measures: To understand and address barriers to improve eye exam compliance.</p> <p>Findings: 1,322/2915 patients screened positive for free eye exam Common reasons for not getting exam -forgetting appointment -lack of transportation -scheduling conflicts -unable to find transportation</p>	<p>Limitations: -Inability to reach patient by telephone due to number not working -language barriers</p> <p>Usefulness: -consider having ability to perform eye exams in the clinic.</p>

<p>Chou,C.F., Sherrod, C., Zhang, X., Barker, L., Bullard, K. M., Crews, J. & Saadine, J. (2013). Barriers to eye care among people aged 40 years and older with diagnosed diabetic 2006-2010. <i>Diabetes Care</i></p>	<p>Design Retrospective analysis</p> <p>Evidence Level 4</p>	<p>27,699 patients from 22 states</p>	<p>Behavioral Risk Factor Surveillance System (BRFSS) Data from 2006-2010</p>	<p>Objective Measurement Examine the barriers in patients aged ≥40 years diagnosed with diabetes in obtaining suggested eye care.</p> <p>Finding There was a 23.5% nonadherence to recommended eye exams most commonly reported reasons are: -no need -no eye doctor -no transportation -unable to get appointment -other -cost -no insurance</p>	<p>Limitations Bias in self-reporting No classification between “person without diabetes” and those undiagnosed. Unknown correlation between patient’s perception and actual clinical diagnosis of vision impairment The result do not represent the entire US just 22 states People without telephones, cellphone only or unable to use phone</p> <p>Strength Large sample size can provide stable estimates Survey provides info on vision health and access to eye care services at a state level Includes detailed questions of barriers</p>
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<p>M.L., Dong, F. & Ablah, E. (2013). Factors contributing to diabetes patients not receiving annual dilated eye examinations. Ophthalmic Epidemiology</p>	<p>Design- Telephone Survey Cross-sectional Evidence level: 4 Paksin-Hall, A., Dent,</p>	<p>432,607 adult participants, Setting: primary care setting</p>	<p>Patients were asked to fill out Behavioral Risk Factor Surveillance System (BRFSS)</p>	<p>Outcome Measures: Identify variables in diabetes patients seeking annual eye exam Findings: Likelihood of obtaining eye exam correlate: - increased age -sex -insurance - education level -income level -Race, marital status and ethnicity did not affect eye exam</p>	<p>Limitations: Mobile phone users, reliability of self-reporting, missing values, Realistic to address variables</p>
<p>Preferred Practice Guidelines (2014) American Academy of Ophthalmology</p>	<p>Design: Evidence-based guidelines Evidence Level: 1</p>	<p>N/A</p>	<p>N/A</p>	<p>Outcome Measures: To identify features and factors related to quality eye care Findings: Type 1 DM eye exams are recommended to begin within 5 years after the diagnosis of Type 1 diabetes and then yearly from there, due to established relationship between severity of length of time pt has diabetes Type 2 is often difficult to</p>	

				determine recommended at diagnosis-patients need to be screened annually.	
Lindenmeyer, A., Sturt, J.A., Hipwell, A., Stratton, I.M., al-Athamneh, N., Gadsby, R., Scanlon, P.H. (2014) Influence of primary care practices on patients' uptake of diabetic retinopathy screening British Journal of General Practice	<p>Design: Qualitative case-based study-interviews</p> <p>Quantitative</p> <p>Evidence Level: 5</p>	General practice setting in three regional screening programs areas	Semi-structured interviews to assist in the identification of the factors related to high or low screening program areas	<p>Objective Measures:</p> <p>To identify factors that contribute to patient retinopathy screening</p> <p>Findings:</p> <p>Modifiable factors that were identified: communication between practice staff, screeners and patients, contacting and motivating patients, integrating screening with routine care, staff perception of non-attenders</p> <p>Non-modifiable factors: language and ethnicity, transport/access, deprivation</p>	<p>Limitations:</p> <p>-small case number</p> <p>-Inability to examine all arrangements between type of location,</p> <p>-set-up was locally adopted</p> <p>Usefulness:</p> <p>There needs to be addition research on addressing both modifiable and non-modifiable factors</p>
Sheppler, C.R., Lambert, W.E., Gardiner, S.K., Becker, T.M. & Mansberger, S.L. (2014) Predicting adherence	<p>Design- Questionnaire</p> <p>Qualitative</p>	316 adults-participants were randomized into either telemedicine group with a nonmydriatic	Patients asked to fill out the Compliance with Annual Diabetic Eye Exam Survey (CADEES)	<p>Outcome Measures:</p> <p>Association with self-reported adherence (if had dilated eye exam in past year)</p>	<p>Limitations:</p> <p>Adherence to self-reporting, small sample, construct measurements, Improve adherence</p>

<p>to diabetic eye examinations. American Academy of Ophthalmology</p>	<p>Evidence level: 2</p>	<p>camera or traditional surveillance group with an eye care provider</p>		<p>Findings: Need to educate pt with new diagnosis about importance of yr eye screening exams along with discuss perceived obstacles and misconceptions.</p>	
<p>Brunisholz, K.D., Briot, P., Hmlilton, S., Joy, E.A., Lomax, M., Barton, N., Cunningham, R., Cannon, W. (2014) Diabetes self-management education improves quality of care and clinical outcomes determined by a diabetes bundle measure. <i>Journal of Multidisciplinary Healthcare</i></p>	<p>Design: Retrospective analysis, case-control study Evidence Level: 3</p>	<p>4,203 adults with type 2 diabetes ages 18-75 between 2011-2012 who received diabetic education from a certified diabetic educator</p>	<p>384 individuals received DSME and 336 were considered a control group on receiving the education</p>	<p>Objective Measures: To assess the impact of the use of diabetes self-management education to improve procedures and results of care. Findings: DSME had improved achievement when compared to those who did not have DSME</p>	<p>Limitations: Did not account for all variations in each practice In control group there may be unaccounted differences Study population was not ethnically diverse</p>
<p>Lee , D.J., Kumar, N., Feuer, W.J., Chou, C.F.,Rosa, P.R., Lam, B.R. (2014) Dilated eye examination screening</p>	<p>Design: Chart review, along with mail and telephone follow up.</p>	<p>200 patients in an urban setting in Florida</p>	<p>Using billing record database, identified patients with diabetes an if compliant with eye exam meaning eye</p>	<p>Objective Measures: To estimate the cause in relation to dilated eye examination guideline adherence in patients with</p>	<p>Limitations: - incomplete follow-up -limited access reaching patient by phone or mail</p>

<p>guideline compliance among patients with diabetes without a diabetic retinopathy diagnosis: the role of geographic access British Medical Journal Open</p>	<p>RCT Quantitative Evidence Level: 4</p>		<p>exam within 15 months, coordinated were taken to assess neighborhood socioeconomic status contact by telephone or mail to fill out a survey if noncompliant</p>	<p>DM, but do not have retinopathy. Findings: Study showed that those living at a greater distance from an eye care clinic had decreased compliance Patient's with access to public transportation decreased compliance for eye exams</p>	<p>-small sample size -language barriers Usefulness: Try improving compliance by the development of community-based screening strategies.</p>
<p>Sloan, F.A., Yashkin, A.P. & Chen, Y. (2014) Gaps in receipt of regular eye examinations among medicare beneficiaries diagnosed with diabetes or chronic eye exam American Academy of Ophthalmology</p>	<p>Design: Retrospective analysis, cohort study Evidence Level: 4</p>	<p>2151 Medicare beneficiaries who responded to HRS over a 15-month period from the 1990's</p>	<p>Individuals were followed for 5 years to determine is beneficiaries received an eye examination</p>	<p>Outcome Measures: To examine aspects associated with routine eye examinations among older adult diabetic patients with related vision problems. Findings: Eye exam rates decreased and factors include -limit physical and mental function -increased distance to an</p>	<p>Limitations: -Used Medicare claims data which is designed for payment and not research -only considered whether beneficiary had ≥1 eye exam in 15 month period.</p>

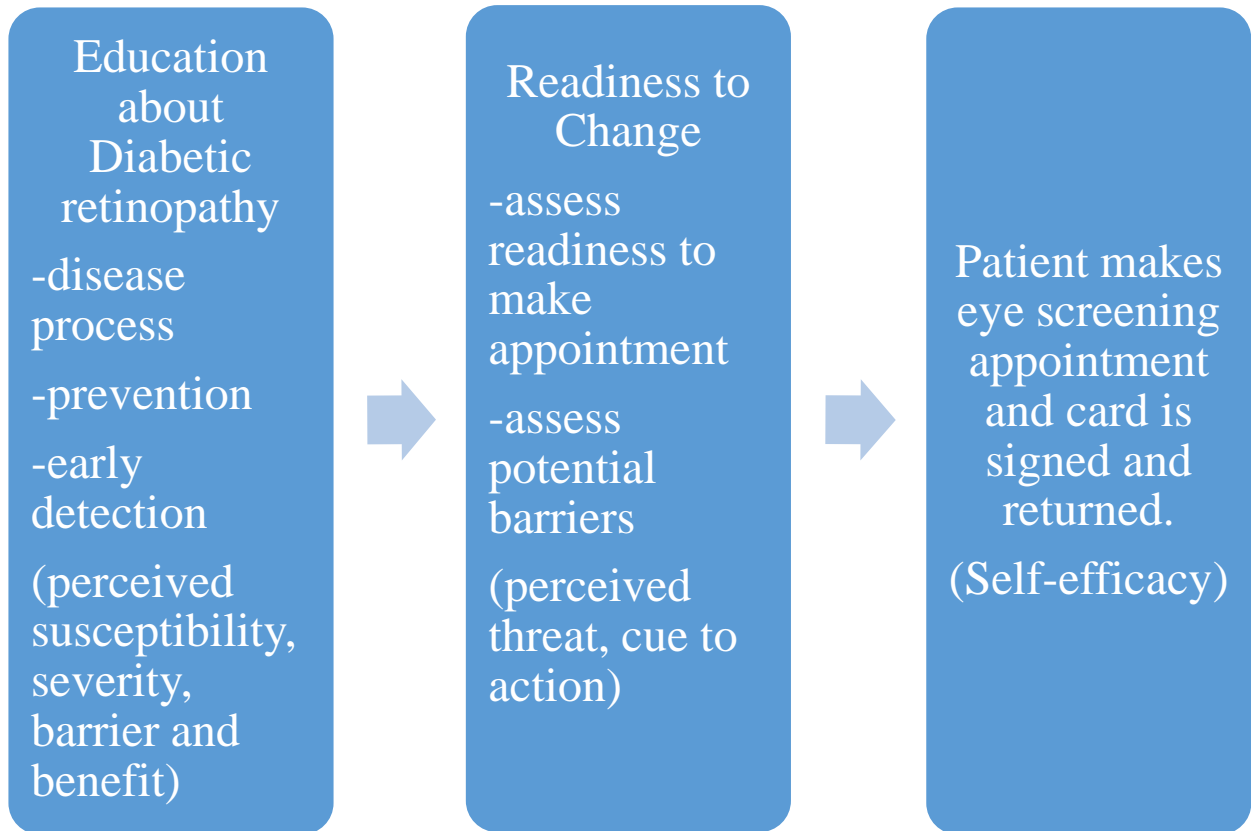
				eye care specialist	
Hatef, E., Vanderver, B.G., Fagan, P., Albert, M. & Alexander, M. (2015) Annual Diabetic Eye Examination in a Managed Care Medicaid Population The American Journal of Managed Care	Design -Data collection, Cohort study Evidence level: 4	8902 Medicaid pt with diabetes (3838-2010 and 5064-2012) either 1) clinic with nonmydriatic camera, 2)or regular eye exam at John Hopkins Health Care between 2010-2012 Setting: Primary care	Data collected from healthcare claims for Medicaid patients with diabetes from 2010-2012, and annual eye exam rates that are reported.	Outcome Measurements: Detect high-risk and adjust factors that play role in non-adherence Findings: Increase in likelihood of compliance is related to access in PCP clinic, incentives offered to provider. Financial incentives to patient lowered compliance Individuals with older age, prolongation of DM, weaker vision and severe retinopathy prone to follow-up within 1 yr	Limitations: -Reporting claims, coding services -Chart review design-only documentation of retinopathy status is charts -Health literacy
Scanlon, P.H., Stratton, I.M., Bachmann, M.O., Land, C., Jones, C. & Ferguson, B. (2015) Screening attendance, age group and diabetic retinopathy level at first screen Diabetic	Design: retrospective analysis, cross-sectional Evidence Level:	689,025 patients from seven programs in In Europe	Data was extracted from four screening programs from times of diagnosis to first screening	Objective Measures: To state the relationship among patient’s age at diagnosis of diabetes, and first eye screening exam Findings: Time from registration to initial screening is related to age of patient at sign up	Limitations: Screening programs have different modalities of delivery and demographic characteristics Usefulness: Help in planning new

Medicine	4			<p>and severity of disease:</p> <p>People ages 18-35 80% did not get screened until over 2 yrs after diagnosis.</p> <p>-<19 yrs and >35yrs likely to get screening.</p> <p>Factors that affect attendance are:</p> <ul style="list-style-type: none"> -patient age -socio-economic deprivation -type of DM -poor glycemic control, HTN, smoking -primary care practices and screening-team related factors 	screening programs.
American Diabetes Association (2016) Standards of medical care in diabetes-2016 Diabetes Care	<p>Design:</p> <p>Evidence-based guidelines</p> <p>Evidence Level:</p> <p>1</p>	N/A	N/A	<p>Objective Measures:</p> <p>To provide standards of care and guidelines for management of diabetes</p> <p>Findings:</p> <ul style="list-style-type: none"> -improve glycemic control to reduce risk of DR -obtain optimal blood pressure, and lipid control to reduce DR -Adults with Type 1 have initial dilated and comp. eye exam within 5 yrs after onset of diabetes 	<p>Usefulness:</p> <p>Helps provide standard of care and guidelines to follow.</p>

				<ul style="list-style-type: none">-Adult with Type 2 should have initial eye exam at time of diagnosis-repeat annually-those with well-controlled DM may consider every 2 years if 1-2 normal exams	
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Appendix C

Theory of Application Diagram

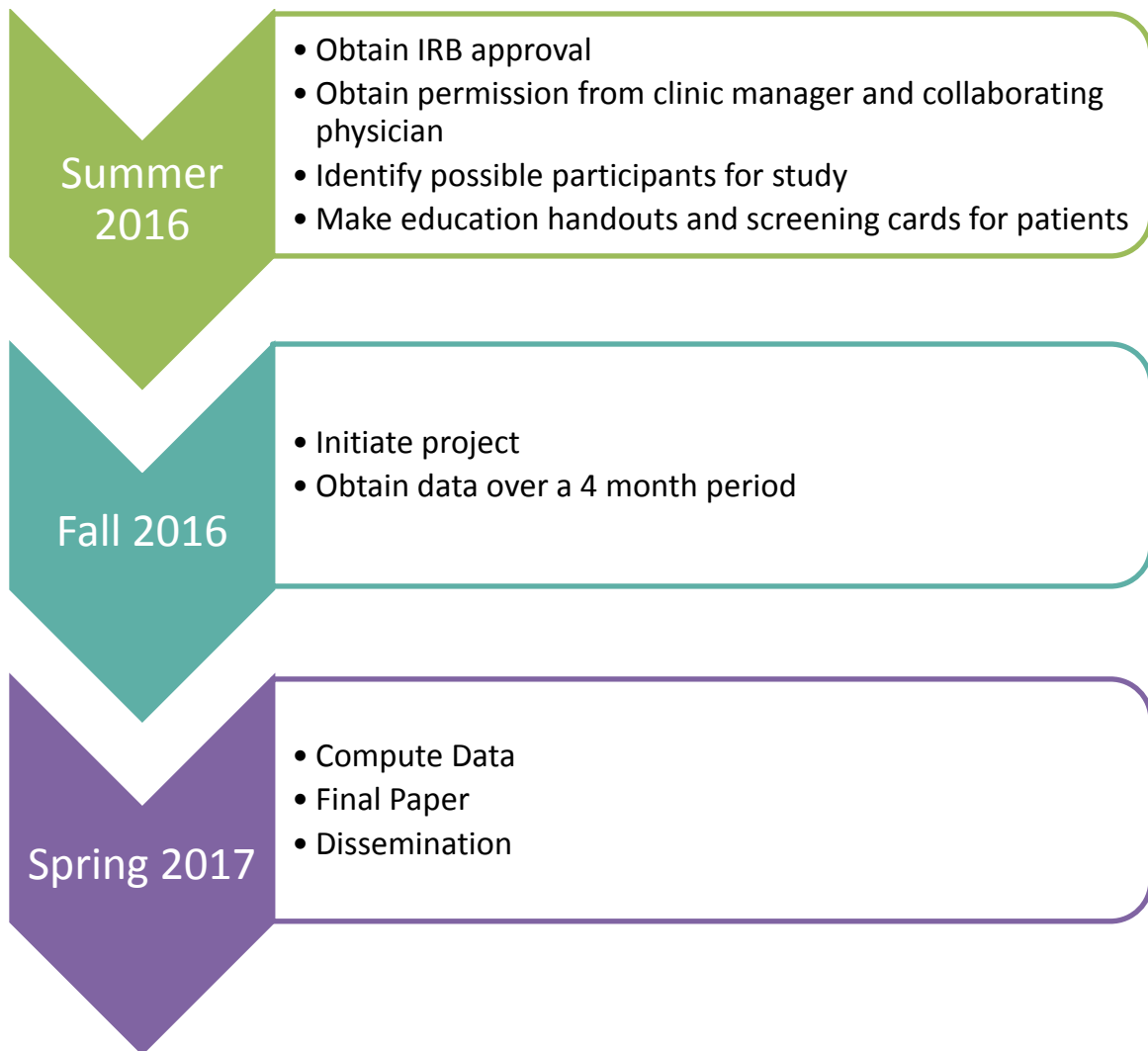


Appendix D

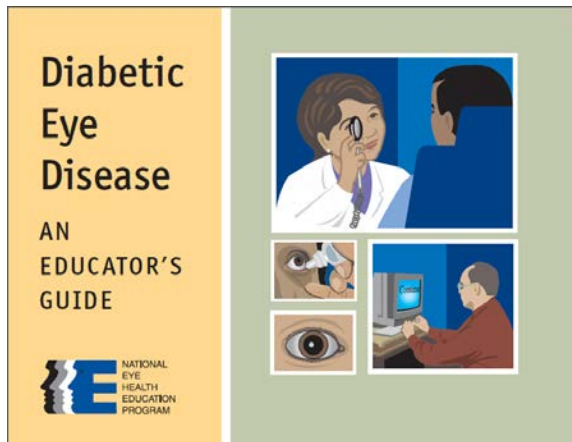
Financial Table for Project

Item	Cost	Total
SPSS Software Premium Grad Pak 23.0	\$169.00	\$169.00
Postcards	\$0.39	\$15.60
Printed Education Supplies	\$50.00	\$50.00
Collaborating Physician	\$80.00/hr	\$1920.00
Nurse Practitioner	\$45.00/hr	\$4320.00
Medical Assistant	\$13.00/hr	\$312.00
Total		\$6,786.60

Appendix E



Appendix F

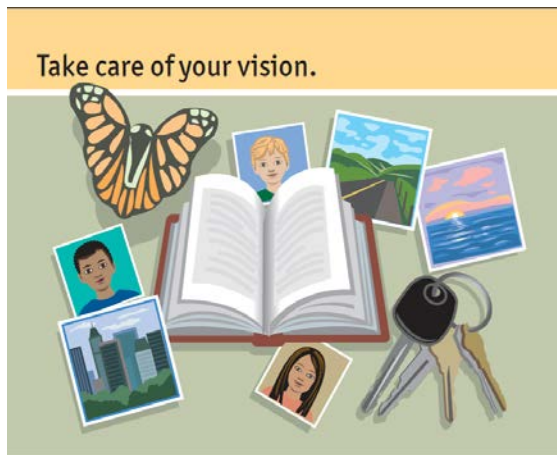


Diabetic Eye Disease: An Educator's Guide, developed by the National Eye Health Education Program (NEHEP), is a patient education tool for health professionals and community-based educators who work with people who have diabetes. A Spanish version, *Enfermedad Diabética del Ojo: Una guía para el educador*, is also available.

The National Eye Institute (NEI) conducts and supports research that leads to sight-saving treatments and plays a key role in reducing visual impairment and blindness. The NEI is part of the National Institutes of Health (NIH), an agency of the U.S. Department of Health and Human Services.

For more information about the NEI, contact:

National Eye Institute
National Institutes of Health
2020 Vision Place
Bethesda, MD 20892-3655
Telephone: 301-496-5248
E-mail: 2020@nei.nih.gov
Website: www.nei.nih.gov



Introduction

Diabetes is a leading cause of blindness among working-age adults in the United States. Yet with early detection and timely treatment, diabetic eye disease can be controlled. The key is to get a dilated eye exam at least once a year. By advising people with diabetes to get a dilated eye exam, you can help reduce their risk of vision loss and blindness.

Financial Aid for Eye Care

Many state and national resources regularly provide aid to people with vision problems. If a patient is in need of financial aid to assess or treat an eye problem, please see the list of programs provided on the NEI Website at www.nei.nih.gov/health/financialaid.asp.

How To Use This Guide

Diabetic Eye Disease: An Educator's Guide is a desktop flipchart that has text to guide your discussion and illustrations for you to show to your patients. Use the back cover to set up an easel for the chart.

Ask When the Patient Last Had an Eye Examination

Ask if the patient has had an exam recently. If the patient has not had an eye exam during the last year, find out why. You may be able to help.

Give Referral Information

If patients do not have a regular source of eye care, providing a list of local eye care professionals will help patients take the next step—making an appointment for a dilated eye exam.



People with diabetes need to know...



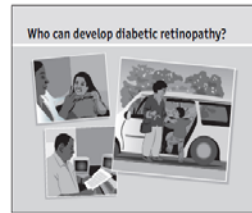
- You are at risk for developing diabetic eye disease, especially diabetic retinopathy, which can cause vision loss—even blindness.
- Getting a dilated eye exam at least once a year is important in finding and treating diabetic eye disease early.
- It is important to talk with your doctor about diabetes self-care.

EDUCATOR PAGE
INTRODUCTION

Who can develop diabetic retinopathy?



Who can develop diabetic retinopathy?



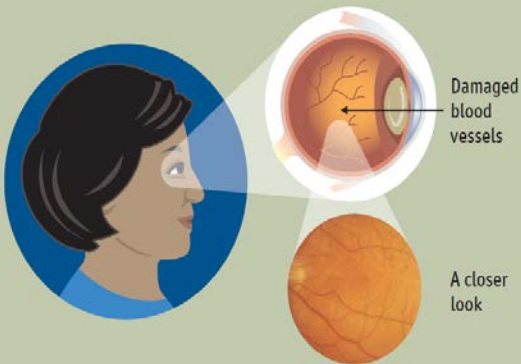
All people with diabetes—type 1 and type 2—can develop diabetic retinopathy, the most common diabetic eye disease. The longer you have diabetes, the more likely it is that you will develop diabetic retinopathy.

Optional information:

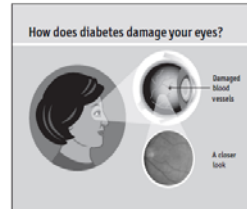
More than half of people with type 1 diabetes have some retinopathy after 10 years of diabetes. Almost one-third of people with type 2 diabetes have some retinopathy at the time they are diagnosed.

EDUCATOR PAGE
RISK

How does diabetes damage your eyes?



How does diabetes damage your eyes?



A healthy retina is needed for good vision. The retina is at the back of the eye. It is the part of the eye that can sense light. Over time, high blood sugar, blood pressure, and cholesterol can damage the tiny blood vessels in your retina. These blood vessels may swell and become blocked. New, weaker blood vessels may form. When these changes occur, a person has developed some level of diabetic retinopathy.

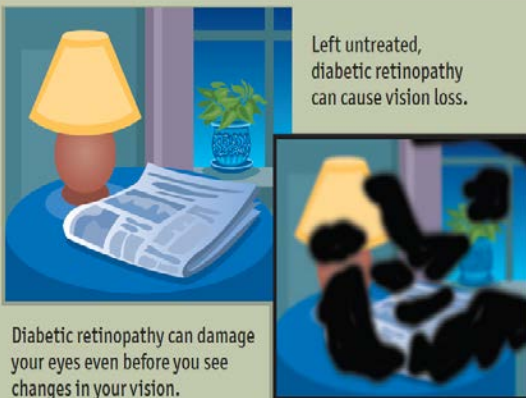
Optional information:

People with diabetes are also at risk for these other diabetic eye diseases:

- **Cataracts:** A clouding of the lens, the part of your eye that focuses light rays on the retina.
- **Glaucoma:** A group of diseases that can damage the eye's optic nerve. The optic nerve is the part of your eye that sends information from your retina to your brain to tell you what you are seeing.

EDUCATOR PAGE
COMPLICATIONS

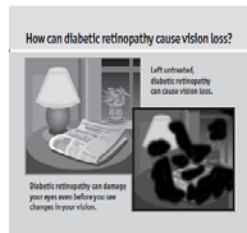
How can diabetic retinopathy cause vision loss?



Left untreated, diabetic retinopathy can cause vision loss.

Diabetic retinopathy can damage your eyes even before you see changes in your vision.

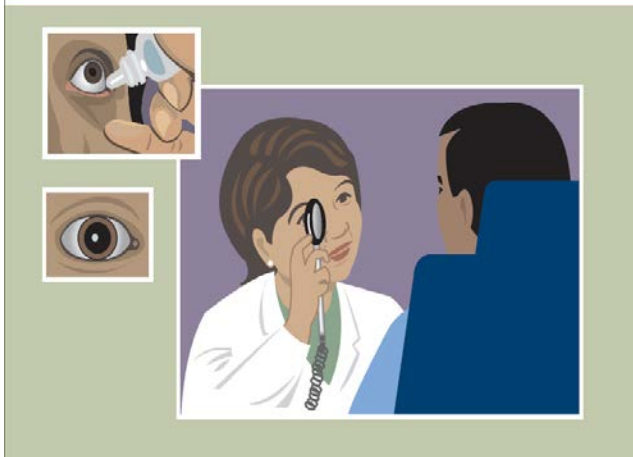
How can diabetic retinopathy cause vision loss?



Diabetic retinopathy can damage your eyes even before you see changes in your vision. Left untreated, diabetic retinopathy can cause vision loss.

EDUCATOR PAGE
COMPLICATIONS

Why is a dilated eye exam important?



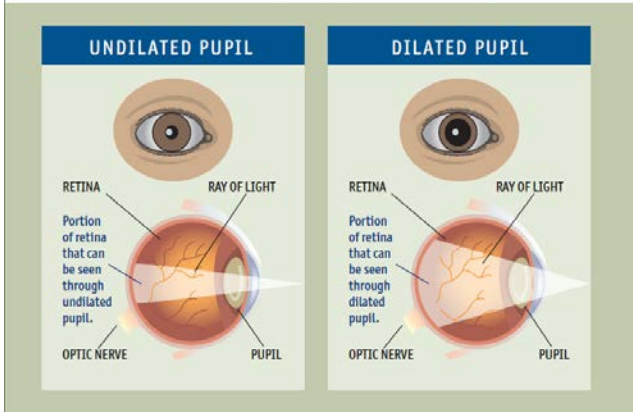
Why is a dilated eye exam important?



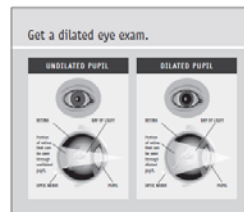
There are no warning signs for diabetic retinopathy. A dilated eye exam allows the eye care professional to see the early signs of the disease and help you before your vision is affected. Finding and treating diabetic retinopathy early can help protect your vision.

6 EDUCATOR PAGE
DETECTION

What happens when you get a dilated eye exam?



What happens when you get a dilated eye exam?



A dilated eye exam from an eye care professional is the best way to tell if you have diabetic retinopathy, before it affects your vision. This exam includes—

- **Pupil dilation:** Drops will be put in your eye to dilate (widen) the pupil. Your eye care professional will use a special magnifying lens to look at your retina and other parts of your eye.
- **Visual acuity:** A test during which you are asked to read an eye chart to measure how well you see at different distances.
- **Tonometry:** A test to measure the pressure inside your eye.

7 EDUCATOR PAGE
DETECTION

What can you do to protect your vision?

T	Take your medications as prescribed by your doctor.	
R	Reach and maintain a healthy weight.	
A	Add more physical activity to your daily routine.	
C	Control your ABCs—A1C, blood pressure, and cholesterol levels.	
K	Kick the smoking habit.	

What can you do to protect your vision?



Get a dilated eye exam at least once a year, and...

Keep **TRACK** of your diabetes:

T: Take your medications as prescribed by your doctor.

R: Reach and maintain a healthy weight.

A: Add more physical activity to your daily routine.

C: Control your ABCs—A1C*, blood pressure, and cholesterol levels.

K: Kick the smoking habit.

EDUCATOR PAGE
SELF-CARE

*A1C is a simple lab test that measures your average blood glucose level over the last 3 months. It is the best way to know your overall blood glucose control.

How is diabetic retinopathy treated?

A CLOSER LOOK

Retina

Damaged blood vessels

Blood vessels after treatment

How is diabetic retinopathy treated?

A CLOSER LOOK

Retina

Damaged blood vessels

Blood vessels after treatment

If you develop diabetic retinopathy, your eye care professional will know when and how to treat the damage to your eyes. Often, laser surgery (using a special beam of light) is performed to treat the damaged blood vessels inside the eye.

Optional information:
 Note: The optional information below may not be necessary to share with the patient at this time. Pictures of these treatments are available on the National Eye Institute Website at www.nei.nih.gov.
 The picture on this page shows the results of scatter laser treatment. There are other treatments for the different ways that diabetic retinopathy can damage the eyes. These include treatments for—

Macular edema: This occurs when the weak blood vessels in the center of the retina leak fluid within the macula. The macula is the central part of the retina responsible for straight-ahead vision. Macular edema is treated with focal laser surgery.

Vitreous bleeding: The vitreous is the large space in the center of the eye. It is filled with a clear gel-like fluid. If this fluid becomes clouded by blood from damaged blood vessels, a person may need an eye operation called a vitrectomy. The cloudy fluid is replaced with a clear salt solution that is similar to vitreous fluid.

EDUCATOR PAGE
TREATMENT

Making the most of your vision...

EDUCATOR PAGE
VISION REHABILITATION

Making the most of your vision...

Treatment may not restore vision already lost to diabetic retinopathy. In this case, a person may have low vision. People with low vision find it difficult to do everyday tasks, even with regular eye glasses, contact lenses, medicine, or surgery. The good news is that vision rehabilitation can help people make the most of their remaining vision and maintain independence.

Vision rehabilitation can—

- Make home and work surroundings safer and more convenient.
- Make it easier to travel alone.
- Show you how to use visual and adaptive devices.

If you develop low vision, your eye care professional can refer you to a specialist in low vision who can help you make everyday activities easier.

EDUCATOR PAGE
VISION REHABILITATION

Remember—get a dilated eye exam.

T Take your medications as prescribed by your doctor.

R Reach and maintain a healthy weight.

A Add more physical activity to your daily routine.

C Control your ABCs—A1C, blood pressure, and cholesterol levels.

K Kick the smoking habit.

Remember—get a dilated eye exam.

Remember—get a dilated eye exam.

T Take your medications as prescribed by your doctor.

R Reach and maintain a healthy weight.

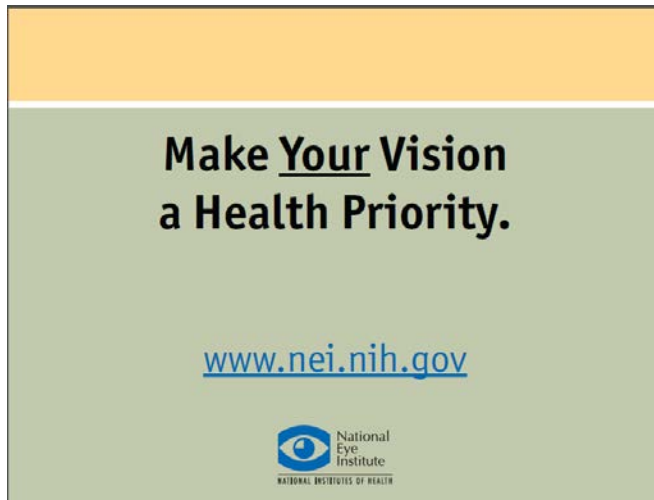
A Add more physical activity to your daily routine.

C Control your ABCs—A1C, blood pressure, and cholesterol levels.

K Kick the smoking habit.

- Diabetic retinopathy has no warning signs.
- Get a dilated eye exam at least once a year.
- Keep **TRACK** of your diabetes:
 - T:** Take your medications as prescribed by your doctor.
 - R:** Reach and maintain a healthy weight.
 - A:** Add more physical activity to your daily routine.
 - C:** Control your ABCs—A1C, blood pressure, and cholesterol levels.
 - K:** Kick the smoking habit.

11 **EDUCATOR PAGE**
SUMMARY



(National Eye Institute, 2005)

Appendix G

Logic Model

PICOTS: In the diabetic patient population does providing diabetic retinopathy specific education and screening card provide an reminders to obtain diabetic eye screening exams?

Inputs	Intervention(s) <i>Activities</i>	Outputs <i>Participation</i>	Outcomes -- Impact		
			<i>Short</i>	<i>Medium</i>	<i>Long</i>
<p>Evidence, sub-topics -lack of education -lack of access -physician/patient relationship -age of diagnosis of illness</p> <p>Major Facilitators or Contributors: -established clinic -good working relationship with collaborative physician -access to patient population</p> <p>Major Barriers or Challenges -compliance -limited access</p>	<p>EBP intervention which is supported by the evidence in the Input column</p> <p>-lack of education</p> <p>Major steps of the intervention -educate patient of diabetic retinopathy -educate ways to prevent -educate about importance of eye screening exams and early detection</p>	<p>The participants (subjects)</p> <p>Diabetic patients</p> <p>Site State Avenue Health Care Clinic</p> <p>Time Frame 5-6 months</p> <p>Consent Needed or other</p> <p>Person(s) collecting data Myself and Medical Assistants (MA)</p> <p>Others directly involved Collaborating physician Office Manager Medical Assistants (MA)</p>	<p>(Completed as student)</p> <p>Outcome(s) to be measured with valid & reliable tool(s)</p> <p>-compliance of eye screening exam</p> <p>-Possible questionnaire regarding knowledge prior and after education</p> <p>Statistical analysis to be used -SPSS</p>	<p>(after student DNP)</p> <p>Outcomes to be measured</p> <p>-compliance of eye screening</p> <p>-increased knowledge</p>	<p>(after student DNP)</p> <p>Outcomes that are potentials</p>

Appendix H

Procedure Diagram



Control Group



Intervention Group



Appendix I

Eye-Q Pre-Test

	True	False	Not Sure
1. People with diabetes are more likely than people without diabetes to develop certain eye diseases.			
2. Diabetic eye disease should have early warning signs.			
3. People with diabetes should have yearly eye examinations.			
4. Diabetic retinopathy is caused by changes in the blood vessels in the eye.			
5. Laser surgery can be used to halt the progression of diabetic retinopathy.			
6. People with diabetes should have regular eye examinations through dilated pupils.			
7. People who have good control of their diabetes are not at high risk for diabetic eye disease.			
8. The risk of blindness from diabetic eye disease can be reduced.			

Adapted from Nation Eye Institute, 2000.

Appendix J

Eye-Q Post-Test

	True	False	Not Sure
1. People with diabetes are more likely than people without diabetes to develop certain eye diseases.			
2. Diabetic eye disease should have early warning signs.			
3. People with diabetes should have yearly eye examinations.			
4. Diabetic retinopathy is caused by changes in the blood vessels in the eye.			
5. Laser surgery can be used to halt the progression of diabetic retinopathy.			
6. People with diabetes should have regular eye examinations through dilated pupils.			
7. People who have good control of their diabetes are not at high risk for diabetic eye disease.			
8. The risk of blindness from diabetic eye disease can be reduced.			

Are you ready to schedule your eye exam? YES NO

If no, why?

Adapted from National Eye Institute, 2000

Appendix K

Hi Marcy,

Thanks for contacting us. As a federal government agency, all of our resources are in the public domain so you can use any of our resources. Good luck with what sounds like a great and important project!

-Neyal

Neyal J. Ammary-Risch, MPH, MCHES

Director, National Eye Health Education Program (NEHEP)

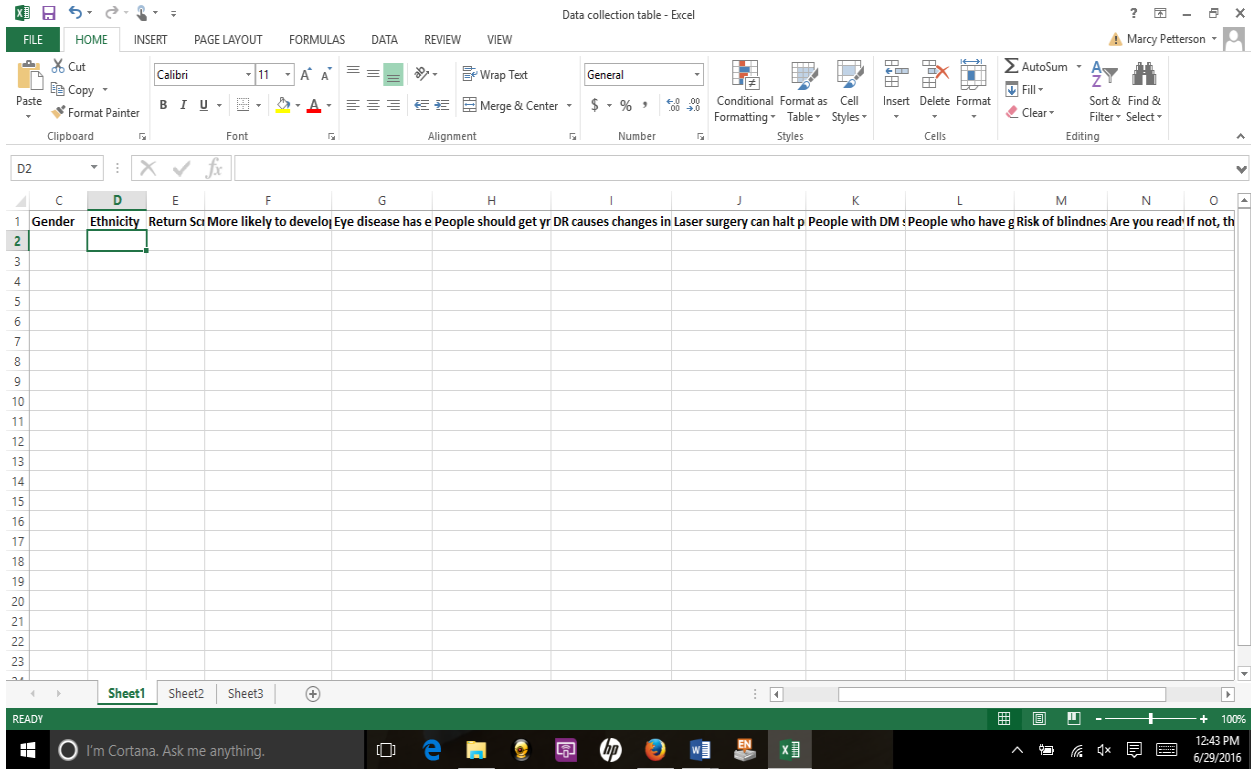
Office of Science Communications, Public Liaison & Education

National Eye Institute (NEI)

National Institutes of Health (NIH)

Appendix L

Data Collection Spreadsheet



Appendix M

Variables for Analysis

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Card	Numeric	21	0	Screening Card...	{1, Returned...	None	30	Right	Nominal	Input
2	Gender	Numeric	7	0	gender	{1, Male}...	None	30	Right	Nominal	Input
3	Ethnicity	Numeric	20	0	ethnicity	{1, Caucasi...	None	30	Right	Nominal	Input
4	eq1	Numeric	8	0	People with DM...	{1, True}...	None	30	Right	Nominal	Input
5	eq2	Numeric	8	0	DM eye diseas...	{1, True}...	None	30	Right	Nominal	Input
6	eq3	Numeric	8	0	People with DM...	{1, True}...	None	30	Right	Nominal	Input
7	eq4	Numeric	8	0	Diabetic Retino...	{1, True}...	None	30	Right	Nominal	Input
8	eq5	Numeric	8	0	Laser Surgery ...	{1, True}...	None	30	Right	Nominal	Input
9	eq6	Numeric	8	0	People with DM...	{1, True}...	None	30	Right	Nominal	Input
10	eq7	Numeric	8	0	People who hav...	{1, True}...	None	30	Right	Nominal	Input
11	eq8	Numeric	8	0	The risk of blind...	{1, True}...	None	30	Right	Nominal	Input
12	eq9	Numeric	5	0	Are you ready t...	{1, yes}...	None	30	Right	Nominal	Input
13											
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24											

Appendix N

Diabetic Eye Screening Exams of 4 Month Period

Intervention Group	Frequency	Valid Percent	Cumulative Percent
Patients Receiving Diabetic Eye Exam by Return of Screening Card	4	30.8%	30.8%
Patients Not Receiving Diabetic Eye Exam	9	69.2%	69.2%
Non-Intervention Group			
Patients Receiving Diabetic Eye Exam	40	31.5%	31.5%
Patients Not Receiving Diabetic Eye Exam	87	68.5%	68.5%

Appendix O

Pre-/Post-Test Fisher's Exact Table

Question	Correct Answer Pre-test	Incorrect Answer Pre-test	Correct Answer Post-test	Incorrect Answer Post-test	Fisher's Exact 2-sided
People with diabetes are more likely than people without diabetes to develop certain eye diseases.	13	0	12	1	
Diabetic eye disease usually has early warning signs.	5	8	10	3	1.000
People with diabetes should have yearly eye examinations.	11	2	12	1	.154
Diabetic retinopathy is caused by changes in the blood vessels in the eye.	7	6	12	1	.462
Laser surgery can be used to halt the progression of diabetic retinopathy.	5	8	12	1	1.000
People with diabetes should have regular eye examinations through dilated pupils.	11	2	12	1	.154
People who have good control of their diabetes are not at high risk for diabetic eye disease	6	7	11	2	.462
The risk of blindness from diabetic eye disease can be reduced.	11	2	12	1	1.000

*p≤.05

Appendix P

Pre-/Post-Test McNemar Test

Question	Correct Correct Pre-/Post-	Incorrect Correct Pre-/Post-	Correct Incorrect Post-/Pre-	Incorrect Incorrect Post-/Pre-	McNemar Test
People with diabetes are more likely than people without diabetes to develop certain eye diseases.	12	0	1	0	
Diabetic eye disease usually has early warning signs.	4	1	6	2	.125
People with diabetes should have yearly eye examinations.	11	0	1	1	1.000
Diabetic retinopathy is caused by changes in the blood vessels in the eye.	7	9	5	1	.063
Laser surgery can be used to halt the progression of diabetic retinopathy.	5	0	7	1	.016*
People with diabetes should have regular eye examinations through dilated pupils.	11	0	1	1	1.000
People who have good control of their diabetes are not at high risk for diabetic eye disease	6	0	5	2	.063
The risk of blindness from diabetic eye disease can be reduced.	10	1	2	0	1.000

*p≤.05

Appendix Q



July 19, 2016

Institutional Review Board

IRB,

This letter serves to provide documentation regarding Marcia Petterson's Doctor of Nursing Practice (DNP) Project proposal. Ms. Petterson obtained approval for her project proposal, *Increasing Compliance of Diabetic Screening Eye Exams*, from the School of Nursing DNP faculty committee on July 19, 2016.

If I can provide any further information, please feel free to contact me.

Sincerely,

A handwritten signature in cursive script that reads "Susan J. Kimble".

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