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## Improving Assessment, Documentation, and Ordering of Diabetic Retinopathy Screenings in a Primary Care Clinic

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The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Assistant Dean for MSN and DNP Studies, on behalf of the program; we verify that this is the final, approved version of the student's DNP Project including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Lauren N. Motto, Student

Dr. Elizabeth Tovar, Advisor

Improving Assessment, Documentation, and Ordering of Diabetic Retinopathy Screenings in a  
Primary Care Clinic

Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Nursing  
Practice at the University of Kentucky

By

Lauren N. Motto

Lexington, Kentucky

2020

## IMPROVING DIABETIC RETINOPATHY SCREENING RATES

### Abstract

**BACKGROUND:** Diabetes mellitus (DM) is the leading cause of new blindness in American adults. As the number of people with type 2 diabetes continues to increase, the total number of people affected by diabetic retinopathy (DR) will continue to rise. Improved access to screening for DR, followed by treatment, if necessary, can reduce the progression to vision loss. Despite national recommendations, less than half of Americans with DM complete annual diabetic retinopathy screenings (DRS).

**PURPOSE:** The purpose of this project was to improve assessment, education, documentation, and ordering of DRS for patients with a diagnosis of type 1 and/or type 2 diabetes mellitus in a primary care setting through provider reminders and patient education.

**METHODS:** This project was a single-center, mixed methods quality improvement project that took place at a family medicine clinic in central Kentucky and was guided by the FOCUS-PDSA model for improvement. A quality improvement (QI) team conducted two PDSA cycles involving 1) family medicine resident education and 2) manually updating the EMR to reflect up to date DRS. A DNP student led a focus group to further identify barriers and facilitators to assessing, documenting, and ordering DRS. A third PDSA cycle incorporating provider and staff reminders as well as patient education was implemented. Data was gathered through retrospective chart reviews between July and October 2020.

**RESULTS:** Descriptive data was reviewed for PDSA cycles one and two. Descriptive data showed that provider education did not improve documentation and manual review of the EMR to identify results from ophthalmology was effective. There were no significant differences found in PDSA cycle three for assessment ( $p=0.35$ ), documentation ( $p=0.99$ ), or ordering

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( $p=0.48$ ) of DRS after intervention. Statistically significant results were found for the association between assessing for DRS and having an annual review completed ( $p=0.002$ ).

**CONCLUSIONS:** Findings suggest that DRS rates could improve with a more robust EMR system, having a reminder system in place, and having annual reviews completed that included DRS. Future investigation should include comparison of these variables and their influence on provider assessment, documentation, and ordering of DRS.

*Keywords: diabetic retinopathy, screening, quality improvement*

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# IMPROVING DIABETIC RETINOPATHY SCREENING RATES

## Improving Assessment, Documentation, and Ordering of Diabetic Retinopathy Screenings in a Primary Care Clinic

### **Introduction**

Diabetic retinopathy (DR) is now the leading cause of new blindness in American adults (American Academy of Ophthalmology, 2014; CDC, 2018). Diabetic retinopathy induced blindness is expected to keep rising as the number of people with diabetes mellitus (DM) continues to increase (CDC, 2018). By the year 2050, the number of Americans with DR and vision threatening DR is expected to double from 7.7 million to 14.5 million people (CDC, 2018). Improved access to early screening for DR followed by treatment if necessary, can reduce the progression to vision loss by greater than 90% (CDC, 2009; Garg & Davis, 2009). Despite recommendations by professional organizations such as the American Diabetes Association (ADA) and the American Academy of Ophthalmology (AAO), less than 50% of patients with diabetes mellitus in the United States follow screening recommendations for yearly DR exams (Keenum et al., 2016).

### **Background**

Retinopathy is a significant cause of morbidity in patients who have diabetes (Frank, 2004; Frith & Loprinzi, 2018). The majority of patients who develop DR do not have symptoms until late in the disease, which is often too late for treatment to be effective (ADA, 2020). Progression tends to be rapid, but treatment can be beneficial in reducing symptoms as well as reducing disease progression (Frank, 2004; Frith & Loprinzi, 2018). Treatment therapies consist of laser photocoagulation and/or vascular endothelial growth factor inhibitors; these therapies are most beneficial in preventing vision loss rather than reversing already established vision changes (Frank, 2004; Frith & Loprinzi, 2018). Therefore, screening patients who have a diagnosis of

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DM regularly is of utmost importance to not only reduce morbidity but also to preserve vision and improve quality of life (Frank, 2004; Frith & Loprinzi, 2018).

Research has shown that timely screening and appropriate treatment for patients with type 1 DM could result in saving 70,000 to 80,000 person-years of sight and in patients with type 2 diabetes more than 94,000 person-years of sight (Javitt et al., 1990; Javitt et al., 1994). Currently, the cost of DM related blindness in the US is \$500 million. Screening should be completed annually once a diagnosis of DM type 2 is made or annually beginning three to five years after the diagnosis of DM type 1 is made (American Diabetes Association, 2020).

In the United States, screening for DR is performed through a dilated fundus examination or retinal photography (ADA, 2020). This is performed with a stereoscopic biomicroscopy and indirect ophthalmoscopy (ADA, 2020). It is essential that screening is performed by well trained personnel, typically an ophthalmologist or optometrist, in order to ensure accuracy (O'Hare et al., 1996). According to O'Hare et al. (1996), the accuracy of performing ophthalmoscopy is considerably lower when performed by primary care physicians. However, in order to increase adherence to DRS, appropriate referral to ophthalmology by primary care providers is crucial (National Eye Institute, 2019). It is important to understand facilitators and barriers to assessing, documenting, and making referrals for DRS in primary care as well as develop tailored interventions to make improvements in this setting.

A quality improvement project was completed at a UK Family Medicine clinic with a quality improvement team and focus group in order to determine root causes for low adherence rates of DRS as well as evaluate the impact of a provider-based intervention.

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## **Purpose**

The purpose of this DNP project was to improve assessment, education, documentation, and ordering of DRS in a primary care clinic.

## **Specific Aims**

- 1) Describe provider facilitators and barriers of adherence to annual DRS
- 2) Evaluate the impact of a provider-based intervention to improve assessment, documentation, and ordering of DRS.

## **Theoretical Framework**

Lewin's theory of change, developed by Kurt Lewin in 1947, was used as a framework for this project. This theory is known as the unfreeze-change-refreeze model, a three-stage process of change that is described using the analogy of changing the shape of a block of ice (Lewin & Cartwright, 1951). Change theory has been used to support change within organizations.

The first stage of Lewin's theory, unfreeze, refers to preparing the organization to accept that change is needed. Once it has been determined that change is needed, the current way of operating has to be broken down. This can be accomplished by challenging the beliefs, values, attitudes, and behaviors that the organization is defined by. The next stage, change, occurs when members of the organization start to understand and look for a new way of succeeding; a new direction. The third and final stage of Lewin's theory, refreeze, is a new state of equilibrium where changes have started to take place and people begin to embrace new ways (Lewin & Cartwright, 1951).

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Lewin's change theory was applied to help guide this quality improvement project. By working with the quality improvement team and focus group to identify, clarify, and understand the low adherence rates for DRS, the unfreeze stage was set into motion. The change phase began by developing strategies to improve adherence, trialing interventions through PDSA cycles, and encouraging staff to get involved. The refreeze stage will come as more PDSA cycles are completed and recommendations can be made to improve assessment, documentation, and ordering of DRS.

### **FOCUS-PDSA Model**

This quality improvement project was guided by the FOCUS-Plan-Do-Study-Act (PDSA) model for improvement. This model is comprised of two stages with steps to guide the quality improvement process. The first stage is FOCUS, which is an acronym for steps of the process: Find a Process to improve, Organize a team, Clarify current knowledge, Understand root causes, and Select a process to improve (IHI, 2019).

The second stage is the Plan-Do-Study-Act (PDSA) cycle. The PDSA cycles aim to answer three fundamental questions: "What are we trying to accomplish?" "How will we know that a change is an improvement?" and "What change can we make that will result in improvement?" (Institute for Healthcare Improvement [IHI], 2019). By taking time to answer these questions, the PDSA cycle is used to guide small scale change to determine if the proposed change will accomplish the goal without disrupting an entire organization (IHI, 2019).

The first step in the PDSA cycle is *Plan*; during this step the team decides what they will test, makes predictions about the outcome, and develops a plan to test the change. The second step is *Do*. The *Do* portion of the cycle tests the proposed change on a small scale, in a real

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setting. Observations, including problems and successes, are documented and data analysis begins. The third step is *Study*. During this step, time is set aside to analyze the data collected during the *Do* step. This data is then compared to previous predictions, summarized, and reflected upon. The final step in the PDSA cycle is *Act*. During this step, modifications are made based on what was learned during the *Study* step. After altering the change, a plan is made to prepare for the next PDSA cycle (IHI, 2019).

### **Literature Review**

A literature review related to DRS was conducted using the following databases: Cochrane Reviews, PubMed, and CINAHL. Key words used in the search included diabetes, retinopathy, screening, provider, diabetic patients, and barriers. Thirteen articles were chosen in terms of quality of evidence, sample size, and themes surrounding DR, screening, and increasing compliance. Articles were not included if they were not written in English and if they were published prior to 2010. Types of studies reviewed included cross-sectional, qualitative, prospective, literature reviews, systematic reviews, randomized controlled trials, and meta-analyses.

### **Synthesis of Evidence**

Research has shown that DRS is an effective strategy to reduce preventable vision loss and further vision complications (American Academy of Ophthalmology, 2014). Of the 13 studies examined, all had the common goal of improving adherence rates among patients; whether it be with general diabetes care or specifically with DRS. Adherence rates were evaluated by studying how patient adherence to DRS was influenced by and/or associated with

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multiple patient risk factors and barriers, provider communication, quality improvement interventions, and varying forms of education.

In order to increase the use of DRS, it is essential to understand what barriers currently exist to screening (Ockrim & Yorston, 2010). Patient risk factors and barriers were evaluated in 50% of the studies. According to Lewis (2015), causes of low adherence rates with DRS are often the result of patient, provider, and system factors. Patient factors include lack of awareness about eye complications related to diabetes, belief that they do not require DRS due to lack of symptoms or being too old/ having perceived invulnerability, lack of financial resources, discomfort and fear from eye dilation, having a separate eye exam appointment from their regular medical appointment, distance and time from screening location/ transportation difficulties, and guilt from the failure to control blood sugar levels if they do in fact have vision problems (Alwazae et al., 2019; Asante, 2013; Hipwell et al., 2014; Kashim et al., 2018; Lake et al., 2017; Lewis, 2015). Provider factors include poor communication and/or counseling regarding services related to diabetes and eye complications. System factors include ineffective procedures for getting patients to come to the clinic, complicated referral systems, and extended wait times for screening and possible treatment (Lewis, 2015).

Barriers and facilitators to DRS are different for young adults and older adults. Through 30 semi-structured interviews (10 younger, 20 older adults), when compared to older adults barriers for young adults included factors such as social influences, consequences, resources, and overall knowledge (Lake et al., 2017). Increasing knowledge and developing individualized education and plan of care was associated with increased adherence (Alwazae et al., 2019; Asante, 2013). Understanding an individual's barriers allows for a tailored intervention to be put into place (Ockrim & Yorston, 2010).

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Evidence based strategies to improve DRS rates found in the literature include strategies related to the patient, provider, and system factors. To improve screening rates for patients, education/information on DR and DRS should be readily available. This can be in the form of leaflets, videos, or even by providing a diabetic educator. For providers, it is recommended to improve communication with patients about DM and DR, to use provider point of care reminders, and to personally recommend annual DRS to patients (Lewis, 2015). Evidence supports that if patients received information from a healthcare provider about self-care with diabetes, it more than doubled their likelihood of following through with the recommendation (Bundemann & Kaplowitz, 2011). Lastly, to improve screening rates from the system level, an EMR system should be adopted that allows for interoperability, communication within the system as well as with outside systems (Lewis, 2015).

In order to provide education to providers, a quality improvement intervention can be implemented in the clinic setting (Bundemann & Kaplowitz 2011; Piyasena et al., 2019; Lawrenson et al., 2017). When evaluating quality improvement initiatives, Lawrenson et al. (2017) demonstrated that there is an association with a 12% increase in adherence to DRS as opposed to no intervention . There were no statistically significant differences between interventions specifically focused towards DRS and general diabetes education (Lawrenson et al., 2017). Overall, addressing barriers to DRS is essential in order to decrease vision loss associated with diabetes mellitus.

### **Methods**

#### **Design**

This project was a single-center, mixed methods quality improvement project focused on increasing provider assessment, documentation, ordering, and patient education of DRS. The



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first part of this project was completed by an interprofessional quality improvement team. The second part, which was the focus of this paper, was an extension of the QI project and led by a DNP student.

### **Setting**

This quality improvement project took place at an urban primary care clinic in an academic medical center located in central Kentucky. This facility offers comprehensive care across the age continuum. The clinic is staffed by 23 providers (including part-time and full-time employees): one Doctor of Osteopathic Medicine (DO), 15 Medical Doctors' (MD), five Advanced Practice Registered Nurses (APRN's), one Doctor of Psychology (PsyD), one Licensed Clinical Social Worker (LCSW), and the affiliated school of medicine's family medicine residents in their 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> year. Working with the providers are registered nurses (RN's), licensed practical nurses (LPN's), and medical assistants (MA's) (University of Kentucky, n.d.).

### **Quality Improvement**

Improvements in the quality of care and patient safety are a top priority at this academic primary care clinic; which led to collaborating with the Center for Quality, Value, and Safety (CQVS) and having a grant approved on June 1, 2013 by the Multi-Specialty MOC Portfolio Approval Program. This grant aims to develop, monitor, and approve quality improvement projects for this academic setting and affiliated providers. By participating in quality improvement teams, student providers are given the opportunity to set and work towards goals through a team approach, aid in data collection and analysis, lead team meetings, and strengthen overall principles of the quality improvement process within the clinic (Barron, 2017). Through

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participation, student providers are able to gain insight and knowledge of how to participate in, as well as initiate making small changes in order to improve the quality of patient care.

This clinic requires that first, second, and third year family medicine residents as well as Doctor of Nursing Practice students, when applicable, take part in a quality improvement project within the clinic. As part of this program, a quality improvement team was assembled in August 2019 to address the rates of one of the six Medicare Access and CHIP Reauthorization Act (MACRA) measures identified as below average. The MACRA is a quality-based payment program designed to measure and facilitate behaviors, interventions, and activities that are needed to influence or change outcomes (MACRA, 2018). The QI team chose to focus on low adherence to DRS. In August 2019, compliance rates in the clinic were 42%. The group met once per month between August 2019 and June 2020 and worked through the FOCUS-Plan-Do-Study-Act (PDSA) model for improvement to address the low DRS rates. The quality improvement team first worked through the FOCUS phase followed by conducting two PDSA cycles. This current project became an extension of the quality improvement team's work and implemented a third PDSA cycle. This fulfilled the affiliated academic centers mission by working to improve quality of care based on research that shows the importance of routine screening for DR.

### **Stakeholders**

Stakeholders in this quality improvement project included patients with diabetes, providers, ancillary staff, office leadership, and ophthalmology.

### **Facilitators and Barriers**

An important facilitator for improving the process for assessing, documenting, and ordering DRS at the clinic was the fact that the MACRA goal of DRS was identified by

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leadership as a clinic priority as well as the clinic's background of quality improvement. Because of the familiarity with the process and culture of quality improvement, providers, staff, and clinic leadership were willing to get involved, provide support for the project, and were available for feedback.

A primary barrier to screening for DR included the fact that the clinic no longer had a fundal camera to perform onsite DRS. By having the camera, the barriers of having to make an additional appointment at an outside facility, transportation, and cost were removed. The clinic expected DRS rates improve. Unfortunately, the clinic did not experience the desired results from having an onsite fundal camera due to not having enough trained staff to perform the screenings, the large time commitment it took to take the pictures (which interfered with regular duties), and the camera was difficult to use, often not producing quality pictures able to be read. Because of this, patients were no longer able to be screened at the clinic and therefore had to schedule at an outside location for DRS. By no longer having an onsite camera, the chances of missed or never made appointments due to time, transportation, feasibility, and cost increased.

A secondary barrier to DRS was the charting system used by the clinic, which lacked interoperability with many ophthalmology clinics, therefore making it hard to access records and ultimately determine if a DRS had been performed. Because of this, records were difficult to access and therefore accurate screening rates were difficult to determine.

### **Sample**

For each PDSA cycle, two different samples were used: 1) the providers and staff and 2) patients medical records.

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### **FOCUS-PDSA Cycle 1 & 2**

FOCUS-PDSA cycles 1 & 2 were conducted by the QI team. This team was made up of six family medicine residents, one DNP student, and two family medicine physicians as advisors. This team was assigned during a quality improvement program meeting. The composition for PDSA cycles one and two included four family medicine residents and a random sampling of 42 patient electronic medical record's (EMR) seen between July 24-July 31, 2020. Charts were included if the patients were 18 and older and had an ICD-10 of diabetes mellitus in their EMR.

### **FOCUS-PDSA Cycle 3**

The third FOCUS-PDSA cycle was conducted by a DNP student as an extension of the QI team's work. Volunteers from the providers and staff of the clinic were gathered for a focus group. To recruit volunteers, three identical emails that described the study and opportunity to participate (see Appendix A) were sent over a two-and-a-half-week period to all providers and staff (September 15- October 5). There were no exclusion criteria for provider or staff recruitment. If volunteers agreed to participate, they replied to the email that they were interested and when they were available to meet for a focus group. Volunteers were then sent a cover letter and link to an online survey on October 7 (see Appendix B). A total of five volunteers agreed to participate in the project, completed the survey, and attended the focus group. This group consisted of three MD's, one APRN, and one LPN; all of whom are key stakeholders. One additional volunteer, a MA, attended the focus group. The MA was asked the day of the focus group to attend by her provider partner due to interest in the topic. All volunteers were women. All survey responses were anonymous. An APRN and MA from the focus group agreed to incorporate a PDSA cycle into their practice.

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The patient population of focus were current patients of the family medicine clinic who were 18 years and older who had an ICD-10 of diabetes mellitus in their EMR. A random sampling of 141 patient EMR's were reviewed between September 23- October 23. Of the 141 EMR's reviewed, 91 were reviewed prior to the PDSA cycle to gain baseline data (control group) and 50 were reviewed post-PDSA cycle (intervention group). All chart reviews were retrospective. Chart reviews evaluated if DRS was assessed for, documented, and/or ordered; the type of visit; if an annual review was completed; and if the patient was seen by their primary care provider (PCP). Informed consent was waived for patients due to not using identifying patient information. Patient data (diabetes mellitus diagnosis and status of DRS) was extracted from the AEHR based on the ICD-10 code of diabetes mellitus.

### **Institutional Review Board Approval**

Institutional Review Board (IRB) approval was obtained as part of the IRB approved larger study with the goal of training primary care providers about quality improvement and healthcare transformation.

### **Procedures**

#### **FOCUS-PDSA Cycles One and Two**

The clinic set a goal of 60% adherence to DRS based on MACRA measures. The baseline screening rate at the clinic was 42%, leaving a gap of 18%. The QI team targeted increasing DRS rates by 5% as the initial goal for this quality improvement project. The QI team created a flow chart to understand the current process for assessing, documenting, recommending/educating, and ordering the exams in the clinic (see Figure 1). To better understand the problem, the quality improvement team created a cause and effect diagram (see Figure 2). Key factors identified

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included elements of documentation, ophthalmology exams at outside clinics, and potential skewed data due to poor EMR communication. The QI team chose to focus on standardizing documentation education for providers and staff and better communication between EMRs from the family medicine clinic and ophthalmology clinic. Ideas brainstormed for how to do this are listed in Figure 3. The most feasible and valuable of these options was to provide educational instruction to residents to show where and how to document eye exams; which was carried out by the family medicine residents.

Two PDSA cycles were designed by the QI team to identify process improvements. During PDSA one, four family medicine residents were educated on how to appropriately document DRS in the EMR over a seven day period. To assess if educating the family medicine residents was an effective way to improve DRS documentation, 10 patient charts were reviewed post-intervention.

During PDSA cycle two, patients were identified that had been seen at UK Ophthalmology and then it was determined if this was reflected on the EMR dashboard as an up to date DRS. The QI team reviewed 32 patient charts who had been identified as having a DRS at Ophthalmology and manually updated the dashboard by placing an official Ophthalmology consult with “Record w/o Ordering.”

### **FOCUS-PDSA Cycle Three**

FOCUS-PDSA cycle 3 was conducted by a DNP student as an extension of the QI team with the same goal of increasing DRS rates by 5%. The focus group gathered by the DNP student worked to further identify barriers and facilitators to DRS adherence as well as to discuss possible intervention strategies to improve this. Despite clarifying problems found in the process

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map previously discussed with the QI team, a problem still existed with assessing for, documenting, and ordering DRS. To address this problem, a SMART goal [specific, measurable, attainable, relevant, time bound] was developed: to increase provider assessment, documentation, and ordering of DRS by 5% through a provider reminder system and patient education, resulting in improved adherence to DRS and overall improved MACRA score for the clinic. To examine the knowledge and perception of providers and staff toward DRS in the primary care clinic, a cover letter and link to an online survey was sent to the volunteers via email. The survey (see Appendix C) was designed and managed using RedCap, a secure platform for managing online surveys. Volunteers were asked to complete the survey within 7 days (October 7-13). The survey had a response rate of 100%.

A 30-minute, DNP student led focus group was held on October 15 in a conference room at the family medicine clinic. All five volunteers plus one MA attended. During the focus group, data gathered from the survey regarding knowledge of, responsibility for, and training of assessment and documentation of DRS was presented to the group members via PowerPoint presentation (see Appendix D). This data was used as a guide for conversation as well as developing an improvement plan. Survey results are presented in Table 4. The group identified that providers and staff knew who and how to assess for DRS, how to document the screening, and have received training on both. However, the group identified that the root causes were (1) providers and staff not actually following through with assessment and documentation as well as (2) not educating patients on the importance of screening. Providers and staff stated that putting these actions into practice was time consuming, something that is easily forgotten, and yet another task on the long list of items needed to be completed during a visit.

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Possible solutions discussed were dedicating one month each year, such as national diabetes awareness month in November, to promoting screening for DR. This would educate and raise awareness of DR for patients as well as serve as a reminder to providers and staff to assess for, document, and order a DRS if needed. Since one month of screening awareness in the clinic would only capture the patients that are seen by a provider that month, the team suggested that a quality improvement technician could be in charge of contacting the patients with an ICD-10 of diabetes mellitus that are not scheduled in the clinic that month to assess whether or not they are up to date on their DRS and communicate to the provider to order the screening if not.

A third PDSA cycle was designed and implemented by a DNP student with the aim to remind providers and staff to assess, document, and order DRS as well as disseminate DRS an educational handout to patients during the visit. A dyad of one APRN and one MA, both of whom attended the focus group, agreed to carry out an intervention for the purpose of improving assessment and documentation of DRS as well as providing patient education about the screenings. Baseline data gathered from the AEHR by a quality improvement technician, showed that DRS compliance rates for the specific provider were at 28%. The provider had 183 patients coded as having diabetes mellitus: 53 patients had an eye exam documented for this year (2020) which yielded a 28% compliance rate, 16 patients (9%) were considered “near due” as they were within the rest of this calendar year (2020), and 114 (63%) patients had not had an eye exam within the past calendar year.

PDSA cycle three was implemented over a three-day period between October 21-23. To gather data following the intervention, retrospective chart reviews were completed; 50 patient charts were reviewed, 10 met inclusion criteria. The intervention consisted of providing patient education on DR and DRS (see Appendix G) as well placing a provider and staff reminder on the



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patient visit card in the form of a yellow sticker (see Appendix F). The MA was responsible for giving the patient the approved patient information sheet on what DR is and why screening is important. The sticker prompted the MA and/or APRN to check next to one of the following options regarding DRS: up to date & documented, need records, or ordered. The sticker was given this design to mimic how the DRS is documented in the provider note. The information sheet was from the affiliated academic center's approved education and was chosen because it discussed causes of DR, symptoms of DR, and ways to screen and prevent DR. Each handout was highlighted to emphasize the areas that discussed that DR is the main cause of blindness in adults and that yearly DRS are essential.

During the rooming process, the MA has the first encounter with the patient. During this initial encounter, the MA obtains vital signs, completes the medication reconciliation, ask what the patient's chief complaint is, and if needed will complete an annual review. The annual review asks safety, lifestyle, and health maintenance questions, one of which is whether the patient has had a yearly eye exam. The MA has the first opportunity to assess for screening as well as give the educational handout. The patient is able to look at this handout while waiting for the provider. The MA then reports off and gives the patient visit card to the provider which serves as a cue to the provider to follow up on the DRS from the MA as well as whether to document a completed exam, obtain a record release form for records from Ophthalmology, or place an order for a DRS.

A control group was used to compare data. The control group was gathered from six randomly selected days between September 23- October 2. Over these six days, 91 patients were seen and 9 had an ICD-10 of diabetes mellitus.

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### **Data Analysis**

Descriptive data was reviewed for PDSA cycles 1 & 2 performed by family medicine residents. For PDSA cycle 3, frequency distributions were used to summarize study variables. Fisher's exact test was used to compare assessment, documentation, and ordering of DRS between the control and intervention groups due to small expected cell counts. All data analysis was conducted using SPSS, version 25 with an alpha level of .05.

### **Results**

#### **PDSA Cycle One and Two**

As a result of PDSA cycle one, it was determined that only 4/10 eligible patients' charts had been appropriately updated for DRS despite resident education. In PDSA cycle two, after manually entering an official Ophthalmology consult with "Record w/o Ordering," there was a 10% increase (from 27% to 37%) in the MACRA measure for DRS. This suggests that better communication between EMR's is needed. The team recommended that the EMR be updated to create better communication in the documentation process.

#### **PDSA Cycle Three**

Post-intervention, of the 10 patients with diabetes seen in the clinic over the three-day sprint, 5/10 patients were assessed for DRS and/or DRS was documented or order was placed. As seen in Table 1, out of five patients that were assessed for DRS and/or DRS was documented or order was placed, 3/5 had an annual review done by the MA, and 4/5 of the patients were seen by their assigned provider. Out of the five patients who were not assessed for DRS, 5/5 were there for acute visits not related to diabetes, and 3/5 of the patients were seen by someone other than their PCP.

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Post-intervention data was compared to control group data. Of these nine patients reviewed in the control group, 2/9 DRS were up to date. One of these visits included an annual review and were seen by their PCP; the provider and MA documented that the screening was up to date in the annual review as well as the provider note. The other visit was a follow up for DM with their primary PCP; the DRS was not documented as up to date in the note. The other seven patients with diabetes seen were not assessed for DRS and there was no documentation and/or ordering of exam. Of these seven patients, 6/7 were with their PCP, one was diagnosed with DM within the month, two were acute visits not related to DM, and none had an annual review. After the intervention, the participating provider offered feedback. Feedback included that the DRS reminder sticker was beneficial as a prompt to either order or document the exam if it had been completed. Results of PDSA cycle three are shown in Table 1. In this cycle, DRS assessment increased from 22% to 50% ( $p=0.35$ ), DRS documentation increased from 11% to 20% ( $p=0.99$ ), and ordering of DRS increased from 0% to 20% ( $p=0.48$ ).

Next, the data was evaluated to determine whether DRS was more likely to be assessed if it was part of an annual review, if it was with the patient's PCP, and/or if it was a part of a wellness or DM follow up visit. Results of this analysis show that regardless of the intervention, these variables played a large role in DRS assessment, documentation, and ordering (see Table 2). Out of the seven patients assessed in the control group and intervention group combined, 71% had an annual review, 86% saw their PCP, and 71% were being seen for a physical or DM follow up. Of the 12 patients not assessed in the control group and intervention group combined, 0% had an annual review, 67% saw their PCP, and 42% were being seen for a physical or DM follow up. These results were statistically significant ( $p=0.002$ ) for the positive association between assessing for DRS and having an annual review.

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As previously mentioned, DR educational handouts were distributed to patients with diabetes seen in the clinic over the three-day intervention period. It was not feasible to follow up on whether or not this had an impact of patient follow through due to time constraints of the project and that ophthalmology was booking appointments approximately six months out from the time the order is placed.

Table 1. *PDSA Cycle Three Results*

	Control (n = 9)  n (%)	Intervention (n = 10)  n (%)	p
Visit type			.07
Acute	2 (22%)	7 (70%)	
Well/follow-up	7 (78%)	3 (30%)	
Annual Review			.99
Yes	2 (22%)	3 (30%)	
No	7 (78%)	7 (70%)	
Provider type			
PCP	8 (89%)	6 (60%)	
Other	1 (11%)	4 (40%)	
DRS assessment			.35
Yes	2 (22%)	5 (50%)	
No	7 (78%)	5 (50%)	
DRS documentation			.99
Yes	1 (11%)	2 (20%)	
No	8 (89%)	8 (80%)	
DRS ordered			.48
Yes	0 (0%)	2 (20%)	
No	9 (100%)	8 (80%)	
DRS Assessed with Annual Review			.99
Yes	2 (100%)	3(60%)	
No	0 (0%) n=2	2(40%) n=5	

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Table 2. *PDSA Cycle Three Results: focused*

	DRS Assessed/Documented/Ordered (n= 7) n (%)	DRS NOT Assessed/Documented/Ordered (n= 12) n (%)	p
Annual Review?			
Yes	5 (71%)	0 (0%)	.002
No	2 (29%)	12 (100%)	
PCP?			
Yes	6 (86%)	8 (67%)	.60
No	1 (14%)	4 (33%)	
Well/Follow Up?			
Yes	5 (71%)	5 (42%)	.35
No	2 (29%)	7 (58%)	

### Discussion

#### Summary

Education of providers yielded little impact on increasing documentation, suggesting that lack of education may not be the cause for low DRS documentation rates. A manual review of the EMR to identify results from ophthalmology was effective, yielding an increase in percentage of documented DRS. The lack of EMR interoperability within the system as well as with outside

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systems was identified as a barrier to accurate assessment and documentation of DRS. This suggests that an EMR with a more robust communication system would more accurately represent the status of DRS and therefore make assessment and documentation more effective. Further review of barriers within the clinic through a focus group prompted a provider and staff DRS reminder system to be implemented. Though not statistically significant, the reminder system revealed an increase in assessment, documentation, and ordering of DRS. Variables that appeared to influence whether or not a patient was assessed for and had documentation of having a DRS was if an annual review was performed by the MA, if the provider seeing the patient was their PCP, and whether the patient was being seen for an acute or annual/diabetes follow up visit. A statistically significant association was found between having an annual review completed and higher rates of assessment, documentation, and/or ordering of DRS. This finding suggests that patients are more likely to have DRS assessed and documented if their visit includes an annual review; making annual reviews the most essential facilitating factor identified in this study. More PDSA cycles should be conducted to further investigate the variables mentioned and what influence they have on assessing, ordering, and documentation for DRS.

### **Interpretation**

Compliance with DRS is a challenge nationally, with less than 50% of patients with diabetes in the United States who follow screening recommendations of yearly DR exams (Lee et al., 2003; Keenum et al., 2016). This DNP project found that the EMR used by the clinic needed improved interoperability and that patients who had an annual review were more likely to be assessed for DRS. Potentially, providers are more aware of DRS when an annual review is completed by the MA or if the patient is being seen for their annual physical and as a result the provider is more likely to continue the conversation started by the MA. This places importance

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on the provider having an MA available to complete patient intake information and annual review when appropriate. However, this is not always feasible due to competing demands and time constraints in the clinic setting. In order to clarify key variables, future studies should exclude acute visits and only focus on annual visits or visits that are specifically related to diabetes management in order to determine a more accurate assessment of screening rates.

Although the reminder system put into place in PDSA cycle three did not prove to be of statistical significance, evidence supports point of care reminders are an effective system for improving clinical situations (Coma et al., 2019). Therefore, a provider reminder may be effective in a different form, such as an EMR on-screen point-of-care reminder (Coma et al., 2019).

Diabetic retinopathy education was distributed to patients with diabetes seen during the three day intervention period. Although this is not a measurable variable in this study due to lack of time to follow up with patients, patient education is largely supported in the research as an important factor for improving patient adherence to DRS and should be assessed in future studies for its effectiveness (Alwazae et al., 2019; Asante, 2013; Lake et al., 2017; Lewis, 2015).

### **Limitations**

This study was designed to test small cycles of change that would eventually lead to system wide changes resulting in improvement of adherence to DRS. A limitation to this study is that relatively few PDSA cycles were completed related to time constraints due to the COVID-19 pandemic. However, subsequent cycles on gradually larger scales have the potential to yield additional important information.

At one point, the clinic had a DR camera to address the barriers of additional time/appointments, transportation, and cost. While this was a great idea in theory, staffing and

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time constraint barriers were identified. Having the camera in the clinic targeted patient barriers but provider and system barriers made it not practical in this particular setting at this particular time. Studies have found that having a fundus camera in the primary care setting has the ability to be a practical, cost effective tool to screen for DR; however it is essential that system barriers such as staffing and training are adequately addressed (Khan et al., 2013).

### **Recommendations**

To improve EMR interoperability, the clinic has plans to transition to a superior EMR by June 2021. Until then, it is recommended that providers be trained in current documentation practices as well as having an assigned quality improvement technician update patient EMR dashboards with current DRS information as was done in PDSA cycle two. This will make provider assessment and documentation more efficient and accurate.

Future quality improvement projects should be conducted with interventions that include multiple providers in the clinic in order to identify other possible barriers that were not captured in this APRN-MA dyad as well as develop a measurable variable for patient education. Follow up with patients who had DRS orders placed and were given the DR educational handout should be assessed to determine if education on DSR had an impact on follow through with screening.

The provider reminder system used to increase assessment, documentation, and ordering of DRS in this study did increase provider compliance, although not statistically significant. Further investigation using a longitudinal study design with a larger sample size is likely to yield more conclusive evidence related to the effect of provider reminder systems in this setting.

As indicated by the results, future efforts in increasing DRS screening assessment and documentation should prioritize annual visits or visits that are specifically related to diabetes management. These visits are typically completed by the patient's PCP and are more likely to



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include an annual review. By controlling the variables of type of visit, whether the patient is seen by their PCP or not, and if an annual review was completed, investigators can conduct a more accurate assessment of facilitators and barriers of diabetic retinopathy screening rates.

Overall, a reminder system put into place in PDSA cycle three is likely to improve DRS when applied to a more narrow group of patients (those being seen for their annual exam/visit related to DM, by their PCP, and/or an annual review is included) and is supported in the literature (Coma et al., 2019).

### **Conclusion**

Diabetic retinopathy is the leading cause of blindness in American adults with diabetes (CDC, 2018). The majority of patients who develop DR do not have symptoms until they are late in the disease, which is often too late for treatment to be effective (ADA, 2020). Despite recommendations by professional organizations such as the American Diabetes Association (ADA) and the American Academy of Ophthalmology (AAO), less than 50% of diabetic patients in the United States follow screening recommendations of yearly DR exams (Lee et al., 2003; Keenum et al., 2016). Screening patients who have a diagnosis of diabetes mellitus regularly is of utmost importance to not only reduce morbidity but also to preserve vision and improve quality of life in patients with diabetes (Frank, 2004). Effective strategies that are supported by the literature and this project include improved EMR interoperability, provider reminders, and annual reviews with the patient's PCP (Coma et al., 2019).

Further investigation is needed to identify additional strategies to improve DRS rates. It is recommended that the clinic conduct additional PDSA cycles building on this current DNP project to further explore provider reminders by prioritizing annual visits or visits that are specifically related to diabetes. By controlling the variables of type of visit, who the patient was

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seen by, and if an annual review was completed, researchers will be able to make a more accurate assessment of screening rates and therefore increase the number of patients that adhere to DRS recommendations. Ultimately leading to a decrease in DR induced blindness and increased quality of life for patients with diabetes.

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Table 3. *Table of Study Measures*

<b>Measures</b>	<b>Description</b>	<b>Level of Measurement</b>	<b>Data Source</b>
<b>Demographics</b>			
Gender	Male vs Female	Nominal	Medical Records
Ethnicity	White, Black, Hispanic, Indian, Native American, Middle Eastern, Mixed Race, Asian, Other	Nominal	Medical Records
Age	Age in years	Interval/Ratio	Medical Records
Educational Level	Less than high school, high school graduate, some college, college graduate	Ordinal	Medical Records
<b>Outcome</b>			
Survey	12 question survey using a Likert scale short answer assessing current knowledge of diabetic retinopathy and screening practices	Ordinal	Administered online survey
Uptake of diabetic retinopathy screening	This is based on diabetic retinopathy screenings charted as complete or done at an outside facility	Ordinal	Medical Records

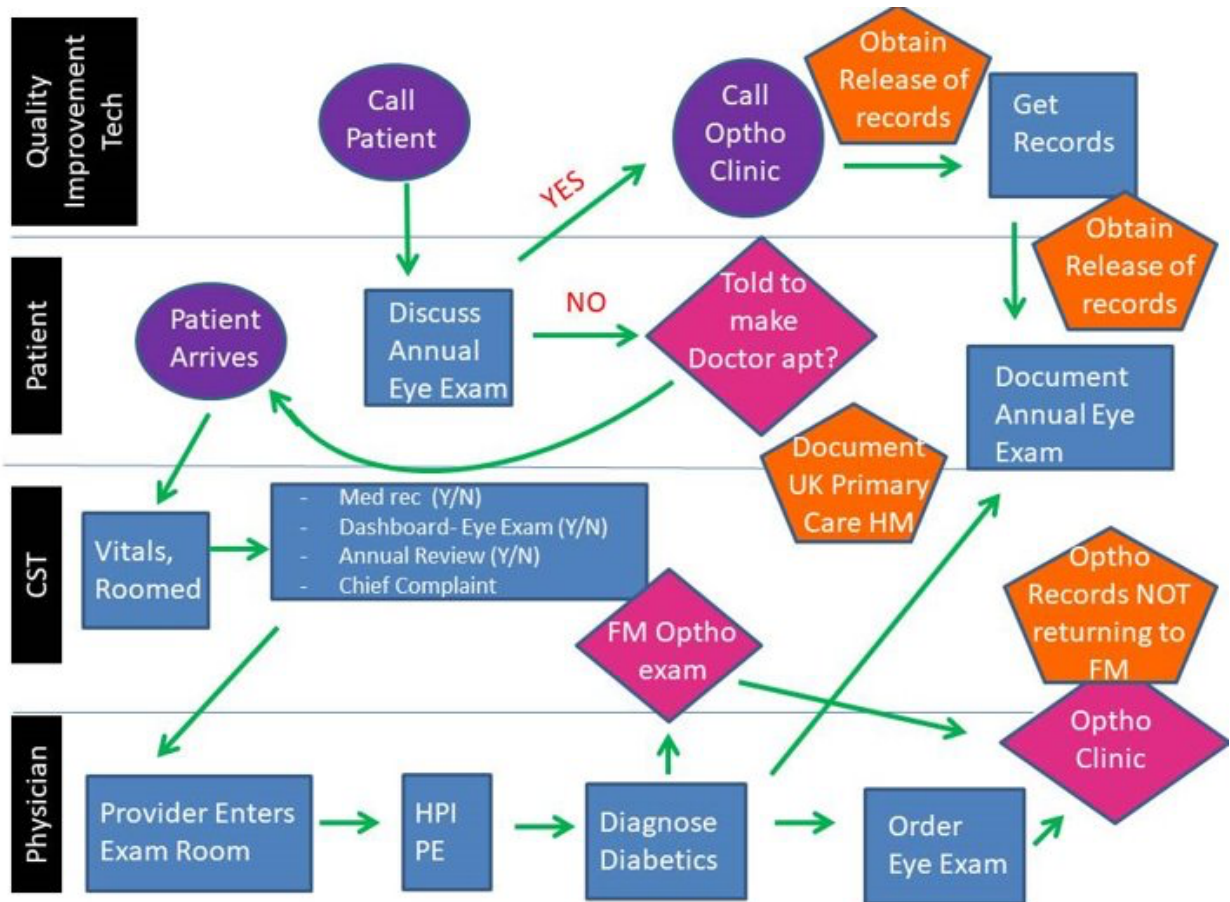
## IMPROVING DIABETIC RETINOPATHY SCREENING RATES

Table 4. *Survey Results*

Barriers to DRS Survey	Disagree/Strongly Disagree	No Opinion	Agree/Strongly Agree
Screening for DR is important for patients with DM:	0%	0%	100%
Patients are aware that DRS are important:	60%	0%	40%
I know who is responsible for assessing whether or not the DRS has been completed for the patient:	20%	0%	80%
I know how to assess whether or not a patient has been screened for DR:	20%	0%	80%
I know how to document that a patient has had a DRS:	40%	0%	60%
I have received training on how to document DRS:	40%	0%	60%
I have received training on who is responsible for assessing if a patients needs a DRS:	40%	0%	60%
DRS rates are low in our clinic because I do not know where/how to document the screening:	80%	0%	20%
DRS rates are low in our clinic because I did not know I needed to assess for it:	60%	0%	40%

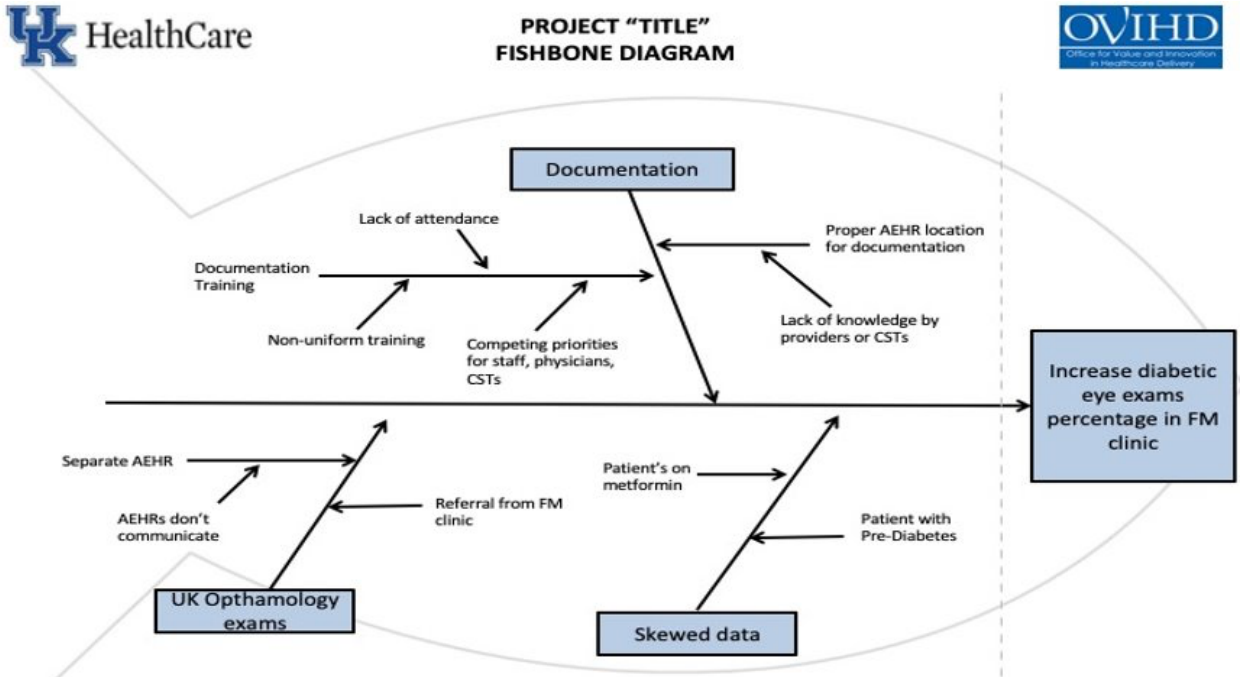
# IMPROVING DIABETIC RETINOPATHY SCREENING RATES

Figure 1. Flowchart for Diabetic Retinopathy Screening Process



# IMPROVING DIABETIC RETINOPATHY SCREENING RATES

Figure 2. Cause & Effect diagram



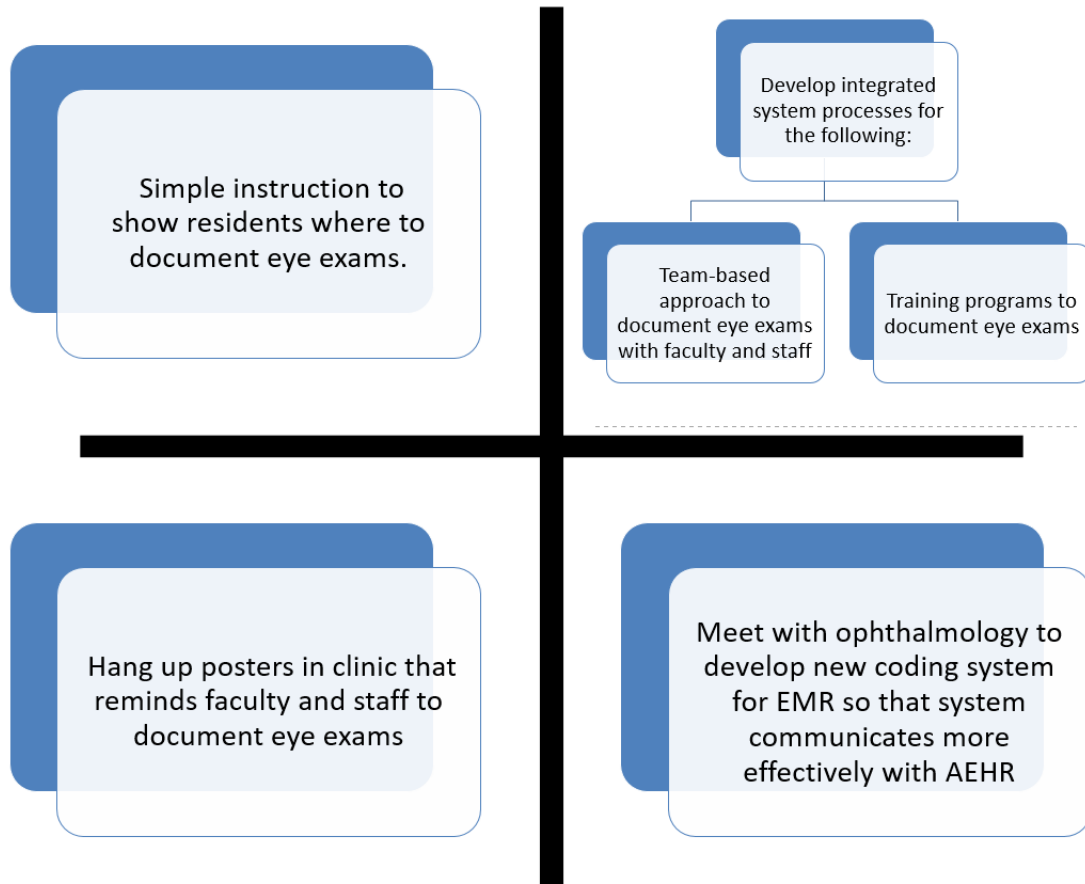
Last Revised: 4/21/20

UK HealthCare Fishbone Diagram

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# IMPROVING DIABETIC RETINOPATHY SCREENING RATES

Figure 3. *Strategies to Improve the Process*



# IMPROVING DIABETIC RETINOPATHY SCREENING RATES

## Appendix A

To: Family Medicine

Hello!

My name is Lauren Motto and I am currently a doctoral nurse practitioner student at the University of Kentucky. For my doctoral project, I am continuing a quality improvement study concerning diabetic retinopathy screenings that was started here at Turfland last fall.

A baseline review of chart documentation showed that diabetic retinopathy screenings are currently at a 42% compliance rate.

The question is, why is this happening?

Is it related to...

- Training?
- Documentation?
- Staff knowledge?
- Patient knowledge?

For my project, I am asking for volunteers from the clinic (providers, LPNs, MAs) to join me in improving this process. The time commitment consists of:

- Responding to first email
- Responding to a short survey via email
- Attending a one-time, 30-minute focus group with lunch provided

If you are interested or know someone who may be interested, please respond to this email. Once a small group is gathered, I will send a short survey via email to volunteers.

I truly appreciate your help in improving this process. Not only will it improve patients' preventative health measures, but it will also help your workflow when it comes to making sure this core measure is completed!

Thank you in advance!

Lauren Motto, BSN, RN, DNP-student  
University of Kentucky Graduate School of Nursing

# IMPROVING DIABETIC RETINOPATHY SCREENING RATES

## Appendix B

### Evaluation of Diabetic Retinopathy Screening Compliance in Primary Care

Dear Family Medicine Clinic Provider and Staff,

You are being invited to take part in this evaluation survey because you are a staff member at UK Family Medicine Turfland.

The survey was designed to assess provider and staff knowledge, barriers, and facilitators of diabetic retinopathy screening at UK Family Medicine Turfland.

Although you will not get personal benefit from taking part in this study, your responses may help to understand more about diabetic retinopathy screening and how we can effectively improve compliance with our diabetic patients.

I hope to receive completed evaluation questionnaires from about 5 people, so your answers are important to me. Of course, you have a choice about whether or not to complete the evaluation survey, but if you do participate, you are free to skip any questions or discontinue at any time. The survey will take 5-10 minutes to complete.

If you do not want to participate in the evaluation survey, there are no other choices except not to take part in the evaluation process. Completion of this evaluation is voluntary.

Although I have tried to minimize this, if any question makes you feel uncomfortable you may choose not to answer it.

Your response to the survey is anonymous which means no names will appear or be used on research documents, or be used in presentations or publications. The research team will not know that any information you provided came from you, nor even whether you participated in the study.

If you have questions about this evaluation study "Evaluation of Diabetic Retinopathy Screening Compliance in Primary Care" please feel free to contact me at ldne222@uky.edu or 502-599-6345; or my advisor, Dr. Elizabeth Tovar at egres2@uky.edu or 859-323-6611.

Thank you in advance for your assistance with this important project.

You may open the survey in your web browser by clicking the link below:  
[Knowledge and Perception of facilitators and barriers to Diabetic Retinopathy Screening Compliance](#)

If the link above does not work, try copying the link below into your web browser:  
<https://redcap.uky.edu/redcap/surveys/?s=HLL7N37THL>

The survey will close Friday, October 9 at 5pm.

Sincerely,

Lauren Motto, UK DNP Student

# IMPROVING DIABETIC RETINOPATHY SCREENING RATES

## Appendix C

Current instrument: **Barriers To Diabetic Retinopathy Screening Compla**

[Return to edit view](#)

NOTE: Please be aware that branching logic and calculated fields will not function on this page. They only work on the survey pages and data entry forms.

<b>Participant ID</b>	<input type="text"/>
<b>Screening for diabetic retinopathy is important for patients with diabetes</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>Patients are aware that diabetic retinopathy screenings are important</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>I know who is responsible for assessing whether or not the diabetic retinopathy screening has been done for a patient</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>I know how to assess whether or not a patient has been screened for diabetic retinopathy</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>I know how to document that a patient has had a diabetic retinopathy screening</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>I have received training on how to document diabetic retinopathy screenings</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>I have received training on who is responsible for assessing if a patient needs a diabetic retinopathy screening</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>Diabetic retinopathy screening rates are low in our clinic because I do not know where/how to document the screening</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>Diabetic retinopathy screening rates are low in our clinic because I have not been educated on its importance</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>Diabetic retinopathy screening rates are low in our clinic because I did not know I needed to assess for it</b>	<input type="radio"/> Strongly Disagree <input type="radio"/> Disagree <input type="radio"/> No Opinion <input type="radio"/> Agree <input type="radio"/> Strongly Agree <a href="#">reset</a>
<b>I document that my patient has or has not completed their diabetic retinopathy screening by...</b>	<input type="text"/> <a href="#">Expand</a>
<b>Other reasons that diabetic retinopathy screening rates may be low are...</b>	<input type="text"/> <a href="#">Expand</a>



# IMPROVING DIABETIC RETINOPATHY SCREENING RATES

## Appendix D

Improving Update of Diabetic Retinopathy Screenings in the Diabetic Population, a Quality Improvement Project

• Focus Group

1

Screening for diabetic retinopathy is important for patients with diabetes.

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

2

Patients are aware that diabetic retinopathy screenings are important.

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

3

I know who is responsible for assessing whether or not the diabetic retinopathy screening has been done for a patient:

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

4

I know how to assess whether or not a patient has been screened for diabetic retinopathy:

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

5

I know how to document that a patient has had a diabetic retinopathy screening:

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

6

I have received training on how to document diabetic retinopathy screenings:

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

7

I have received training on who is responsible for assessing if a patient needs a diabetic retinopathy screening:

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

8

Diabetic retinopathy screening rates are low in our clinic because I do not know where/how to document the screening:

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

9

Diabetic retinopathy screening rates are low in our clinic because I have not been educated on its importance:

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

10

Diabetic retinopathy screening rates are low in our clinic because I did not know I needed to assess for it:

Response	Count
Strongly Disagree	0
Disagree	0
Neutral	0
Agree	10
Strongly Agree	10

11

I document that my patient has or has not completed their diabetic retinopathy screening by...

Using the EMR system, including the format and linking "report" or "order" status to determine when to flag a patient under the EMR system.

By chart review

By patient history

By patient history and chart review

12

Other reasons that diabetic retinopathy screening rates may be low are...

Patients are not aware of the importance of diabetic retinopathy screening.

Patients do not understand the importance of diabetic retinopathy screening.

Patients do not know where to go for a diabetic retinopathy screening.

Patients do not know how to schedule a diabetic retinopathy screening.

Patients do not know how to pay for a diabetic retinopathy screening.

Patients do not know how to get a referral for a diabetic retinopathy screening.

Patients do not know how to get a prescription for a diabetic retinopathy screening.

Patients do not know how to get a referral for a diabetic retinopathy screening.

Patients do not know how to get a prescription for a diabetic retinopathy screening.

13

IMPROVING DIABETIC RETINOPATHY SCREENING RATES

Appendix E

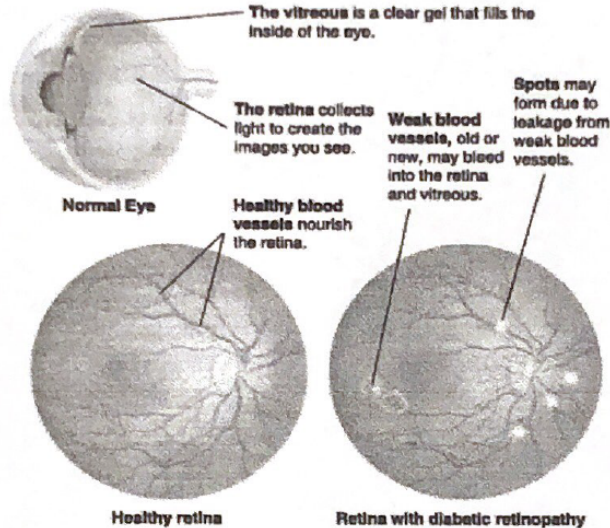
<b>NEXT APPOINTMENT</b>		Patient Name: _____
<b>Date:</b>	<b>Time:</b>	Your Primary Care Provider: _____
		Today's CST: _____
		Today's Provider: _____
		Today's Room #: _____
		Checked-Out By: _____
<u>What is your healthcare goal for your clinic visit today?</u>		<b>Diabetic Retinopathy Screening</b> ___ Up to Date & Documented ___ Need records ___ Ordered
<b>Today's Vitals:</b>		
Height: _____ ft. _____ in.	Blood Pressure: _____ / _____	Heart Rate: _____
Weight: _____ lbs.		Respirations: _____
		Temperature: _____
		Oxygen: _____
Medications to stop:	Medications to start:	Labs <input type="checkbox"/>
		X-ray <input type="checkbox"/>
		Other <input type="checkbox"/>
<b>Next Steps:</b>		
Return to Clinic in: _____	<input type="checkbox"/> Call in: _____	<input type="checkbox"/> Schedule

Appendix F



What Is Diabetic Retinopathy?

Diabetic retinopathy is the main cause of blindness in adults. It happens when diabetes harms blood vessels in the eye. These weak vessels leak fluid into a part of the eye called the retina. New blood vessels can break and bleed into the retina. Old blood vessels can leak and cause swelling. These vessels can damage parts of the retina. This can cause blurry, distorted vision.



What causes diabetic retinopathy?

Diabetes is the cause of this eye disease. Over time, diabetes weakens blood vessels all over the body, even in the eyes. Poor blood sugar control can make it worse. So can:

- Smoking
- High cholesterol
- High blood pressure
- Pregnancy

This health problem happens more often in Hispanics and in African Americans.

What are the symptoms?

You can have diabetic retinopathy without knowing it. There is often no pain and no outward sign. Over time, you may notice blurring or some vision loss. Some people have trouble seeing at night or see spots or floaters. Symptoms may come and go. Early treatment and good control of risk factors may help prevent vision loss or blindness.

What can you do?

Have your eyes checked at least once a year by an eye specialist. Your healthcare provider will tell you when and how often you need these exams. You can also help control your diabetes through:

- Exercise
- Diet
- Medicine, if needed

If you already have diabetic retinopathy, these same steps may help you control it, too. But don't do exercises that raise your blood pressure quickly.

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