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Increasing Annual Retinal Exams among Patients with Type 2 Diabetes

Afokoghene H. Odhu
Grand Valley State University

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Kirkhof College of Nursing

Grand Valley State University

Advisor: Dianne Slager, DNP, FNP-BC

Advisory Team: Gabriel Williams, MD; and Meridell Gracias, DNP, AGPCNP-BC

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Abstract

The Center for Disease Control and Prevention (CDC, 2017) reports that approximately 30 million people in the United States (US) have diabetes. Approximately 8 million have diabetes retinopathy (DR) (CDC, 2018). DR is the leading cause of vision impairment in type 2 diabetes patients. Left untreated, DR can result in loss of vision and blindness (Hernández, Simó-Servat, Bogdanov, & Simó, 2017). The US spends approximately $500 million dollars annually in the treatment of diabetes-related blindness (CDC, n.d.). Early detection and management of DR through tight glycemic control, aggressive blood pressure and lipid management is essential to preventing complications of the disease (Cunha-Vaz, 2004). Thus, the National Committee for Quality Assurance (NCQA) and the American Diabetes Association (ADA) endorse yearly diabetic retinal exam screening as part of the management of diabetes (NCQA, 2019; ADA, 2016). Failure by providers to properly manage DR results in forfeiting of an enhanced reimbursement (MVP Health Care, 2018). The purpose of this Doctor of Nursing Practice (DNP) project is to implement an intervention to address the question: Can implementation of a retinopathy protocol improve adherence to screening and treatment standards of care for type 2 diabetes patients and improve quality metrics from baseline at a Midwest (Federally Qualified Health Center (FQHC)? The DNP project utilizes the Burke-Litwin model as the conceptual model and explores the phenomenon of interest, improving the annual retinal exam among patients with type 2 diabetes. Donabedian model guided the interventions of this DNP project (Donabedian, 1988). The Plan, Do, Study, Act (PDSA) framework served as the implementation strategy to support the evidence-based interventions (Health Improvement Scotland, 2019). The intervention is designed to address the clinical question related to: (1) the documentation of the completed retinal exam results in the electronic health record (EHR), and (2) implementation and evaluation of an educational sessions intervention on Type 2 diabetes Quality Improvement (QI)

metrics for DR. As a result of these interventions, there was 25.83% improvement in dilated retinal screening with significance of $p = 0.0064$. This improvement in quality indicator metrics demonstrated the effectiveness of a retinopathy protocol in the management of diabetes retinopathy in an FQHC primary care practice.

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Executive Summary

The Center for Disease Control and Prevention (CDC, 2017) reports that approximately 30 million people in the United States (US) have diabetes. Diabetes if not properly managed can lead to several health issues, including blindness. Diabetic retinopathy (DR) is the number one cause of vision impairment in type 2 diabetic patients (Hernández, Simó-Servat, Bogdanov, & Simó, 2017). Management of DR requires collaboration with staff and patients, utilizing evidence-based practice in early identification and the management of the disease (Esper & Walker, 2015; Han et al., 2016). To reduce DR associated blindness, annual retinal exam must be a priority. It is essential to measure the progress of disease management using quality indicators. Early identification (through retinal screening) and treatment of diabetes retinopathy can protect those with diabetes mellitus from permanent vision loss (CDC, 2018). Various studies demonstrate that quality improvement strategies that focus on the meaningful use of the EHR have been shown to be particularly effective in increasing annual retinal exams in type 2 diabetes patients (Esper & Walker, 2015; Han et al., 2016).

The purpose of this Doctor of Nursing Practice (DNP) project was to implement intervention that would address the question: Can a manual audit and documentation of diabetes retinal exam result improve the number of type 2 diabetes patient who satisfy the quality matrix at a Midwest Federally Qualified Health Clinic (FQHC)? The Burke-Litwin model was used as the conceptual model and explores the phenomenon of interest, improving the annual retinal exam among patients with type 2 diabetes.

The completion of an organizational assessment in a Midwestern primary care clinic indicates several issues causing the low rate of type 2 diabetes patients who complete the annual retinal exam. This included failure to receiving ophthalmology consult note, incorrect/lack of

documentation of completed ophthalmology visit result, and limited knowledge regarding the proper documentation of result and the purpose for documenting the result. The Plan, Do, Study, Act (PDSA) framework served as the implementation strategies to support the evidence-based interventions to improve the process of retrieving and documenting completed ophthalmology retinal exam results. An additional benefit of increasing annual retinal exams in type 2 diabetes patients is an enhanced reimbursement to the organization (MVP Health Care, 2018).

The interventions designed to answer the clinical question were: (1) the documentation of the completed retinal exam results in the electronic medical record [EHR], and (2) implementation and evaluation of an educational sessions intervention on Type 2 diabetes Quality Improvement (QI) metrics for Diabetes Retinopathy (DR). The implementation phase of this project will be completed by January 18th, 2020. The protocol will be developed and dropped at the site for staff and administrative personnel to ensure sustainability.

As a result of these interventions, 25.83% improvement in retinal exam screening among type 2 diabetes patients with significance (p = 0.0064).. Prior to this DNP project, only 37 percent type 2 diabetes patients met the quality metric for an annual retinal exam in the primary care clinic. The improvement in quality indicator metrics demonstrated the effectiveness of a retinopathy protocol in the management of diabetic retinopathy in a primary care FQHC in West Michigan.

In conclusion, this DNP project demonstrated how utilization of the Burke-Litwin model to explore the phenomenon of interest, improving the annual retinal exam among patients with type 2 diabetes, can improve the process of retrieving and documenting completed ophthalmology retinal exam results, leading to improvement in annual retinal exam QI metrics for type 2 diabetes patients. This DNP project also demonstrated that the Donabedian model

DNP project and PDSA framework can be utilized to successfully guide the implementation of education and training to staff to engage in appropriate documentation of retinal exam results to impact the evidence-based prevention of retinopathy. This DNP project demonstrated how the interventions of (1) appropriate documentation of completed retinal exam results in the EHR, and (2) implementation and evaluation of an educational sessions intervention on Type 2 diabetes QI metrics for DR were effective interventions for increasing annual retinal exams in type 2 diabetes patients. Over time, this QI initiative has the potential to continuously improve patient outcomes and provide increase reimbursement to the organization.

Introduction and Background

In 2015, 9.4% of the US population had diabetes and 1.5 million adults are diagnosed with diabetes every year (ADA, 2018). Diabetes if not properly managed can lead to different health issues, including blindness. Diabetic retinopathy (DR) is the number one cause of vision impairment in type 2 diabetic patients (Hernández et al., 2017). Also, failure by providers to properly manage diabetes retinopathy results in forfeiting of an enhanced reimbursement (MVP Health Care, 2018).

The ADA recommends that type 2 diabetes patients should have dilated retinal examinations when they are first diagnosed and that they should continue to have subsequent annual dilated retinal examinations after the initial comprehensive examination. The ADA recommendation added that if there is no evidence of retinal disease or damage and a patient has a well-controlled blood sugar, then retinal exams can occur yearly or every two years (ADA, 2019). Early identification and treatment of diabetic retinopathy through tight glycemic control, aggressive blood pressure and lipid management can protect those with diabetes mellitus from permanent vision loss (CDC, 2018; Cunha-Vaz, 2004).

Despite the seriousness of complications that may result from poor adherence to diabetes retinal exams, many patients do not complete the annual retinal exam. In a study conducted of primary care patients, Fisher et al. (2016), found that only 43% adhered to the dilated eye exam for the period of two years that the study was conducted. Several factors influence the completion of the yearly dilated eye exam required of type 2 diabetes patients. Some of these factors include failure to order ophthalmology referral, failure to scheduled ordered referral, failure to attend scheduled referral, failure to send completed ophthalmology report to clinic, and incorrect/lack of documentation of completed retinal exam result in the electronic health record

(EHR). The management of diabetes retinopathy requires collaboration with staff and patients in the development of education and training to implement correct systems for referral, documentation in the EHR and appropriate follow up (Esper & Walker, 2015; Han et al., 2016).

Quality improvement (QI) strategies that focus on the meaningful use of the EHR have been shown to be particularly effective in increasing annual retinal exams in type 2 diabetes patients (Esper & Walker, 2015; Han et al., 2016). Evidence demonstrates that primary care clinics can improve diabetes quality measures through meaningful use of the EHR (Jung, et al., 2017). The NCQA and the ADA developed guidelines for type 2 diabetes QI metrics in 1995. The Centers for Medicare and Medicaid Services (CMS) and the NCQA endorses yearly diabetic retinal exam screening as part of the diabetes-specific standard of care and outcome measures to monitor and assess the quality of diabetes management (NCQA, 2019; ADA, 2016). The measures are important for delivering quality evidence-based care and a foundation for value-based reimbursement for many commercial insurance programs (NCQA, 2019). To measure the progress of disease management, it is important to make use of quality indicators.

Evidence-Based Initiative

Diabetic Retinal Screening-Specific Endorsed Quality Improvement Metrics

The CMS and the NCQA endorsed yearly diabetic retinal exam screening as part of the diabetes-specific process and outcome measures to monitor and assess the quality of diabetes management (NCQA, 2019; ADA, 2016). The measures are important for delivering evidence-based care, and are a foundation for value-based reimbursement for many commercial insurance programs (NCQA, 2019).

Effective Diabetes Retinal Exam Quality Improvement Intervention

The meaningful use of the EHR through proper documentation has been shown to improve quality metrics for various disorders. Several studies demonstrate that primary care clinics can improve diabetes quality measures through structured documentation for better data management (Vuokko et al., 2017; Jung, et al., 2017; Hemo, Shahar, Geva, & Heymann, 2018). Interventions channeled towards proper documentation of data results in improvement of quality measures for diabetes patients (Hemo et al., 2018; Han et al., 2016; Esper & Walker, 2015). Thus, in conjunction with selected conceptual models, evidence-based interventions were employed in the implementation and evaluation of evidence-based QI initiative for this sustainable project.

To address the clinical questions, the interventions designed to answer the clinical question were: (1) the implementation of a retinopathy protocol, (2) the documentation of the completed retinal exam results in the EHR, and (3) the implementation and evaluation of an educational sessions intervention on Type 2 diabetes QI metrics for DR.

Assessment of the Organization

The DNP project site was a primary care clinic affiliated with a large not-for-profit health care system, located in an underserved urban community in the Midwest. This organization is striving to increase the number of type 2 diabetes patients who complete the annual retinal exam to meet up with the QI metrics. The clinic has established this goal for several reasons. First, the staff identified that compliance with yearly diabetes retinal exam and proper documentation was not being properly carried out. When the clinic ran their quality metrics for annual diabetes exam through their software, only 16% of diabetes patient complete the annual screening for retinopathy. Thus, the staff made the decision to create a QI project to increase the number of type 2 diabetes patients who complete yearly retinal exam, and to improve consistent

documentation of these exams. The goal is to improve the HEDIS measures to early identify and manage diabetes retinopathy, and better capture Centers for Medicare and Medicaid Services CMS money for the clinic (MVP Health Care, 2018).

The clinic providers were often referring diabetes patients for ophthalmology visit and several patients claimed to have completed the retinal exam. However, the EHR was unable to query this data because the result of the ophthalmology visit was either not documented or was incorrectly documented. Data were not documented because of staff failure to use the required template for documentation, and staff acknowledge deficits regarding proper documentation for completed retinal exam result. The clinic management staff wants the QI project completed to improve their quality metrics for the clinic to meet up with the HEDIS measure. Also, quality indicators will serve as a measure to assess performance and quality of care of an organization. Moreover, many payers are now providing additional reimbursement to providers who complete the quality measure for annual diabetes retinal exam (The Physician Alliance, 2016).

The site for the project is a clinic that is part of a larger ambulatory network that belongs to a non-profit hospital, which currently monitor the QI metrics of the clinic. The organization is a Federally Qualified Health Center (FQHC) with Medicare/Medicaid, private insurers, and self-pay patients. The current electronic health record in the organization has the capabilities for quality metric reporting to insurers. The clinic has been losing additional reimbursement due to low quality-indicator metrics.

Improving the outcome of patients and receiving increased reimbursement are important motivators in increasing the number of those who complete the annual retinal exam among type 2 diabetes patients. The providers in the clinic struggled to improve the quality metrics. Thus, the QI project is designed to help improve the process for improved quality metrics

Conceptual Model

Two conceptual models were used to guide this DNP project. The Burke-Litwin model was used to explore the organizational readiness and system changes needed for the phenomenon of interest. The Donabedian model was used as the conceptual model to examine the phenomenon. The PDSA model was used as the conceptual framework to guide the implementation of the project.

The Burke-Litwin Model

The Burke-Litwin model of organizational performance and change was used to articulate the necessary features for this project. This model was chosen because it addresses some components of the primary care clinic and how they interrelate in the time of a change. To improve the annual retinal exams in type 2 diabetes patients, the external environment, mission and strategy, tasks and skills, leadership, management practices, and structure were considered (Burke & Litwin, 1992). The external environment refers to any outside conditions such as ophthalmology referral that influences the performance of the organization. Mission and strategy are the central purpose of the organization and the processes to achieved it. The mission of the organization to provide healing to all, including the underserved members of the community. Thus, this QI project is very important to achieving the organization's mission. Tasks and skills involve understanding the demands of specific task and having the knowledge needed to accomplish them. In the case of the QI project, the care manager and providers understand the need to increase the number of type 2 diabetes patients who get dilated retinal screening and are willing to support the project to accomplish their objective. Leadership refers to the executive (the practice manager and other leadership members) responsible for providing direction and serving as a role model for the others to take necessary actions. Management practices refer to

the actions and activities of managers to carrying out the organization's strategy and this include

planning, communication, and control. Structure refers to the arrangement of people according to

their specific functions to ensure effective implementation of the mission and strategy of the

organization. The organization provides the staff from various departments to ensure successful

implementation of the project. All six components were simultaneously considered in the Burke-

Litwin model (Burke & Litwin, 1992). The focus of the DNP project was concentrated on the

external environment and the development of the structure using the Burke-Litwin model to

guide each of the two interventions. To ultimately answer the clinical question, quality metrics

were compared to assess the management practices to see if they were in line with the

organization strategy in improving annual retinal exams in type 2 diabetes patients. A

visualization of the Burke-Litwin model is illustrated in Appendix A.

The Donabedian Model

The Donabedian model guided the exploration of the phenomenon of interest, improving the

annual retinal exam among patients with type 2 diabetes. (Appendix B). There are three main

aspect of the Donabedian's model. They are the structure, process, and outcomes.

Structure

This refers to any component that contributes to the setting in which care is delivered.

These components include the material resources (e.g. equipment, technology), human resources,

and organizational structure (e.g. medical staff organization) (Donabedian, 1988). A key

component applicable to the project is the material resources, such as the technology. With the

aid of the EHR, data can be documented for proper tracking of those who have completed the

annual screening. Appropriate documentation in the EHR can help improve the number of those

who adhere to the annual dilated retinal exam for diabetes patients. Also, the organizational

structure such as the medical staff will help with the implementation and sustainability of the

project.

Process

Care processes refer to the approaches employed by an organization to provide care.

These approaches include the services and treatments the patients receive. (Donabedian, 1998).

The primary care clinic currently requires all type 2 diabetes patient to complete an annual

dilated retinal exam. For patients to be said to have satisfied the quality metric for annual retinal

screening, the EHR must capture the ophthalmology result. However, these results are either

improperly documented or not being documented at all. Thus, integrating a retinal protocol in the

plan of care will help increase the number of type 2 diabetes patients who satisfy the quality

metric.

Outcomes

Outcomes refer to the impact of care in health status of patients such as increase in

patient's knowledge or care satisfaction (Donabedian, 1988). Currently, only approximately 16%

of type 2 diabetes patients in the clinic satisfy the quality metrics for retinal screening. Failure to

meet the quality metric puts these patients at greater risk for complications associated with

diabetes retinopathy. The clinic can even lose Medicare/Medicaid funding if quality metrics are

not being met. The proposed retinopathy protocol will help increase the number of type 2

diabetes patients who satisfy the annual dilated retinal exam required. The exploration of the

phenomenon guided the interventions needed to improve the QI metrics for this project.

The PDSA Framework

The PDSA framework guided the DNP implementation which included each of the three

distinct interventions: (1) the implementation of a retinopathy protocol, (2) the documentation of

the completed retinal exam results in the EHR, and (3) implementation and evaluation of an

educational sessions intervention on Type 2 diabetes QI metrics for DR. The PDSA framework

involves four steps: (1) Plan the change based on evaluation of data, (2) Do or try out the change

on a small scale, (3) Study or analyze to see if the change had the desired result, and (4) Act to

standardize the new process or implement a new change (Melnyk & Fineout-Overholt, 2015). A

visualization of the PDSA framework is illustrated in Appendix C.

Ethics and Human Subject Protection

Prior to the review of data, the Institutional Review Board determination as quality

improvement project was obtained from the clinical organization.

Key Stakeholders

Moran, Burson, and Conrad (2017) describe key stakeholders in an organization as

persons who have an impact on the implementation and sustainment of the desired project. There

are several key stakeholders in the primary care clinic for this quality improvement project. The

primary key stakeholders are the patients who will influence and benefit from the outcome of the

project. Other stakeholders include office practice managers, providers, care manager, master of

social work (MSW), medical assistants (MAs), licensed practical nurses (LPNs), registered

nurses (RNs), front desk personnel. The referral ophthalmologists are also stakeholders. These

groups of stakeholders played a role in the success of the quality improvement project, as well

influencing the outcome.

SWOT

An analysis of strength, weaknesses, opportunities, and threat (SWOT) was performed on

the primary care clinic. The SWOT analysis helped to visualized and examined the internal

strengths/weaknesses as well as the external opportunities/treats of the organization. A visual

representation of the SWOT analysis is illustrated in Appendix D.

Strengths: The primary care clinic has many strengths. The clinic is a part of a large healthcare

system in the Midwest. The organization has a clearly defined values, vision, mission, and

strategic plan. They are committed to serve the underserved and immigrant members of the

community. The clinic is centrally located to be able to reach the underserved populations. The

practice manager along with other staff members identified that the majority of diabetes patients

are not completing the annual dilated retinal exam and they wanted a process to help close the

gap in the issue. All staff were willing to support the practice change and interventions towards

increasing the number of type 2 diabetes patients who complete the annual dilated retinal exam.

Weaknesses: The clinic has several weaknesses. They have had high turnover of managers and

providers which has resulted to some quality measures being neglected. Staff lack the knowledge

on how to satisfy the required quality measure in the current EHR. Lack of an ophthalmology

office within the practice and easily accessible ophthalmology offices has led to failure by some

patients to complete the annual dilated retinal exam. The organization is transitioning to a new

EHR in 2 months, making it difficult to implement new processes to meet quality metrics for

diabetes retinal exams. Currently, to satisfy the quality metric, completed dilated retinal exam

results must be manually documented, if they fail to transfer automatically into the required field

in the EHR.

Opportunities: The clinic could improve their patients' outcome through improvement in

quality metrics. The project also presents the opportunity for increase in care quality and

reimbursement for the organization by increasing the number of type 2 diabetes patients who

complete the annual dilated retinal exam. The clinic can develop their technology to fully utilize

the tools available in the EHR. The organization has the support of the DNP student to help them work on the QI project to meet their quality metrics.

Threats: The most outstanding threat is the failure by some ophthalmologists to send referral results until they are prompted by the clinic. Also, social determinants of health such as transportation, access, and health literacy have created barriers for some patients to attend scheduled ophthalmologist referrals. There is a competition with two health organizations in the neighborhood. Failure to provide quality care could result to losing patients to competitors. Similarly, the clinic could lose their FHQC if they fail to meet the HEDIS measure for diabetes care.

Problem Statement

The Midwestern primary care clinic did not meet the HEDIS measures for diabetic retinal screening in 2019 for several reasons, including: (1) not ordering ophthalmology referral, (2) not scheduling ordered ophthalmology referral, (3) not attending scheduled ophthalmology referral, (4) not receiving ophthalmology consult note, (5) incorrect/lack of documentation of completed ophthalmology visit result, and (6) limited knowledge regarding the proper documentation of result and the purpose for documenting the result. The following clinical questions addressed these identified issues: Can the number of type 2 diabetes patients who complete the annual retinal exam in a Midwestern clinic be improved through (1) the implementation of a retinopathy protocol, (2) the appropriate documentation of the completed retinal exam results in the EHR, and (3) implementation and evaluation of an educational sessions intervention on Type 2 diabetes QI metrics for DR? A comprehensive literature review provided support for this evidence-based initiative and support the meaningful use of EHR to meet the quality metrics for annual retinal exam for type 2 diabetes patients.

Literature Review

Method

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline served as the framework for the basic findings of the review (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009). The literature review for this QI project was conducted through an extensive search of numerous databases: CINAHL, Pubmed, Google Scholar, and MEDLINE. The search for literature was limited to systemic review, randomized controlled trials, and cohort studies (qualitative and quantitative). Keywords used for the literature review included 'annual retinal exam', 'type 2 diabetes retinal exam', 'increasing adherence to annual diabetes retinal exam', 'diabetes retinal exams and EHR', 'meaningful use of EHR to improve quality measures for annual retinal exam', 'improving adherence to annual diabetes retinal exam', 'diabetes retinal exam and primary care', 'incentives to satisfy annual retinal exam and diabetes', 'diabetes and retinal exam and primary care', 'increasing retinal exam among type 2 diabetes patients in primary care', and 'satisfying annual diabetes retinal exam and primary care'.

The search yielded 726 articles. No duplicates were found. Each review was screened using inclusion and exclusion criteria according to PRISMA criteria [Moher et al., 2009] (Appendix E). Review of major subjects heading resulted in the removal of 641 articles that did not meet the inclusion criteria. In addition, 77 articles were excluded after an in-depth examination of content, as these did not meet inclusion criteria. The remaining 8 full-text articles were assessed and 5 were included in this review. Data extracted is shown in Appendix F.

Summary of Results

The systematic review by Vuokko et al. (2017) examined structured documentation which is the implementation of one or several commonly agreed-upon patient documentation tools in the EHR. The review was based on the analysis of 85 original articles from 1975 to 2010. The review used a 12-step systematic review protocol adapted from the Cochrane method. Structured documentation in the EHR demonstrates a higher quality of care related to retinal screening and care in patients.

The retrospective cohort study by Hemo et al. (2018) examines the use of a diabetes registry to improve quality of care. The study included 84,876 Maccabi Healthcare Services (MHS) members, but 58,182 met the inclusion criteria for the study. The study calculated the total number of diabetic quality of care tests performed out of a total of 7 items. These tests include: Glycosylated hemoglobin (HbA1c), 2) low-density lipoprotein (LDL), 3) albumin/creatinine ratio (ACR), 4) measurement of weight and height for the calculation of body mass index (BMI), 5) retinal fundus exam, 6) foot exam, and 7) measurement of blood pressure. The study demonstrates an improvement in the performance of the quality metrics such as BMI, blood pressure, and foot fundus exams during the period of the study.

In a cross-sectional survey/cohort study, Han (2016) investigated the meaningful use of the EHR through disease registry to determine if there were differences in quality of care. There were 12,514 (both type 1 and 2 diabetes) that met the inclusion criteria for the study. The study focused on the use of registries for the patient reminder and the use of registries for quality improvement. This study shows that the use of registries for patient reminders was associated with an improved rate of 6% for laboratory testing and 7% dilated retinal exams. Similarly, the use of registries for quality improvement was associated with a 15% reduction in avoidable hospital utilization and a 20% reduction in emergency department (ED) visit. The results of the

study demonstrate that the use of registries for patient reminder improved patient quality of care, whereas no improvement in the quality of care was seen with the use of registries for quality improvement.

Jung, et al. (2017) evaluated the impact of providers participation in meaningful use on the quality of care for Medicare patients. The study participants included 303,110 Medicare enrollees that are 65 years and older. The participants were evaluated based on four quality measures which include colorectal cancer screening. While there were improved odds of colorectal cancer screening for those who participated in meaningful use relative to the comparison group, there was no such improvement for diabetic retinopathy screening, diabetic nephropathy screening, or influenza vaccinations. Meaningful EHR use was associated with higher odds of colorectal cancer screening.

Finally, the retrospective cohort study by Esper and Walker (2015) evaluate the documentation of specific quality oncology practice initiation measures before and after an educational intervention to a group of advanced practice nurses. The preintervention chart audits of 100 records were reviewed and found less than 80% compliance in measurements areas, whereas the postintervention demonstrated remarkable improvement in all nine indicators addressed during the educational intervention. The increase in the knowledge of documentation and provision of tools to increase the efficiency of documentation led to improved quality of patient care.

Evidence to be Used for the Project

The QI project employed a diabetes retinopathy protocol and a manual documentation of referral results from an ophthalmologist consult note as noted in successful studies. The goal is to

increase the number of type 2 diabetes patients who satisfied the annual quality matrix for retinal exams, and to improve the process incorporating the EHR.

One way to increase the number of patients who satisfy the annual retinal exams is by meaningful use of the EHR through manual audit, and documentation of retinal exam results in the EHR. Evidence demonstrates that documentation of data and diabetes registries enable the collection of data for providers to intervene to meet the quality of care for type 2 diabetes patients (Vuokko, et al., 2017; Hemo, et al., 2018; Han, et al., 2018). Adherence to the annual dilated eye exam helps in the promotion of health through the prevention of complications and management of the microvascular retinopathy associated with diabetes.

Thus, to improve health outcomes and satisfy the quality metric for annual retinal exams, the healthcare providers should ensure that all type 2 diabetes patients have their retinal exams ordered, completed and results documented in the EHR. This can be assessed through a monthly manual audit of those type 2 DM patients who were seen in the clinic.

<div align="center">Project Plan</div>

Purpose of Project and Objectives

The purpose of this quality improvement project is to increase the occurrence of annual diabetic retinal exams among type 2 diabetes patients within a primary care clinic to prevent/manage microvascular retinopathy associated with diabetes and enhance reimbursement for same. The clinical question is: *Does implementation of a retinopathy protocol improve adherence to screening and treatment standards of care for type 2 diabetes patients and improve quality metrics at a Midwest FQHC?* The objective is to determine the following:

1.   If ophthalmology referral was ordered

2.   If ophthalmology referral was scheduled

3.   If ophthalmology referral visit occurred

4.   If resulting report of completed ophthalmology visit was sent to the primary care clinic

5.   If correct documentation of completed retinal exam result in the primary care clinic's

         EHR-occurred

Design for the Evidence-based Initiative

The design for the DNP project was a development of an annual diabetic retinal exam

protocol intervention. The efficacy of this intervention was assessed with a manual chart review

and documentation, with a pre/post-intervention comparison to evaluate practice change

following protocol implementation. The PDSA framework underpins and guides the project

(Appendix C). The DNP student implemented the project with the assistance of an advisor who

is an expert in QI projects and a primary care provider; an experienced site mentor who is a

primary care provider. The DNP student carefully analyzed each step of the PDSA cycle to

determine appropriate quality improvement implementation strategies. The DNP student has

received IRB exemption for this QI project from the organization's Human Research Review

Committee.

Setting and Participants

The project took place in a midwestern primary care clinic. Participants are adult patients

between the age of 18 and 75 who have a diagnosis of type 2 diabetes. The intervention is

targeted to improve care for type 2 diabetes patients. There are several key stakeholders in the

primary care clinic for the quality improvement project. They include the office providers,

practice manager, and MAs. Other stakeholders include RNs, care manager, MSW and the front

desk personnel. The referral ophthalmologists and patients are also stakeholders. These groups of

stakeholders played a role in the success of the quality improvement project, as well as

influencing the outcome. Inclusion criteria include patients (over age 18 to 75) with ICD-10 code

indicative of type 2 diabetes who were seen at the clinic from 2019 until the present will be

included in the quality improvement (QI) project.

Implementation Model: PDSA Cycle

For the purpose of the proposed project, the PDSA cycle was used to evaluate and

determine if an implementation of a retinopathy protocol improved the QI metrics for DR in a

primary care clinic.

Plan

There was a development and implementation of a retinopathy protocol for type 2

diabetes patients to improve annual retinopathy screening and follow up. The process change

incorporated an evidence-based protocol to improve documentation of the completed retinal

exam results in the EHR. Each step in the pathway was constructed to allow process and

outcome metrics to be gathered and evaluated. The plan was divided by pre-implementation,

implementation, and postimplementation phase. Each step of the project is outlined under the

Implementation Strategy of this document as illustrated in Appendix G.

Do

The next step of the PDSA cycle is implementation. This phase was started after the IRB

and project approval. There was a brief educational session for clinical staff. Staff were educated

on appropriate documentation of dilated retinal exam result in the EHR and proper follow up for

those who have not completed the annual dilated retinal exam. After the educational session was

completed, there was an implementation of the education through manual documentation of

dilated retinal exam results for all type 2 diabetes patient in the EHR. The MAs, LPNs, or RNs

completed the manual documentation of all completed dilated retinal exam results faxed to the

clinic from the ophthalmology office. As the implementation progresses, clinic staff were

reminded to watch out for faxed dilated retinal exam result and to properly document them in the

EHR. Staff were also reminded to send email messages and phone calls as a reminder to patients

who have not had the annual dilated retinal exam to complete the screening. The DNP student

functioned as a project facilitator by being in the primary care clinic during the project

implementation.

Study

Data were gathered after a two-month period of protocol implementation. The gathered

data included ordered ophthalmology referral, scheduled ophthalmology referral, ophthalmology

referral visit occurrence, sent result report of completed ophthalmology visit to clinic, correct

documentation of completed retinal exam result in the EHR. The overall goal was to improve the

number of type 2 diabetic patients who received annual dilated retinal exams and follow up if

indicated. Analytical statistics was used to analyze the data to determine if there is a significant

improvement in the number of type 2 diabetes patient who completed the annual dilated retinal

exam.

Act

Based on the data gathered from the study of the project, revisions to the pathway were

made as warranted. Results from the project drove pathway modification, when necessary.

Specific patient comorbidities related to diabetes complications will be important to address in a

revised retinopathy protocol in the future. Outcome and process metrics were evaluated to make

future practice changes and revision of the PDSA cycle as necessary.

Implementation Steps, Strategies, and Timeline

The use of evidence-based implementation strategies support practice change. In order to ensure timely project completion, a monthly timeline including all necessary project steps was designed as shown in Appendix H. This timeline consists of necessary meetings to ensure adequate time for implementation, data collection, analysis and final project defense. The following are the strategies and the actions taken to ensure the success of the project:

1. Assess the readiness, identify barriers and facilitators of change in the organization by September 15, 2019. To ensure the success of a project, Powell et al. (2015) states the importance of assessing the readiness and the impediments to change within an organization. A SWOT analysis was completed in April 2019 to determine the strength, weaknesses, opportunities, and threats that could influence the success of the project. The organizational assessment identified that the quality measures for the yearly retinal exam needed for type 2 diabetes patients is not being met.

2. Education of stakeholders. Informal education was started October 23, 2019 to the MAs and RNs about proper documentation of dilated retinal results. Moreover, there was a formal education of key stakeholders at the clinical site. Below are the steps that were to achieve this objective:

   - Clinic staff received a formal education on December 12, 2019 about the retinopathy protocol, the purpose of the protocol, and how to satisfy the quality metric for annual dilated retinal exam screening. Feedback and questions were addressed by allowing open discussion.

   - A reference manual of this retinopathy protocol pathway was provided to staff at the educational session. The manual outlined the purpose of the diabetes protocol and the proper way to document dilated retinal exam results.

3. Retinopathy protocol was implemented into practice for type 2 diabetes patients as a standard practice by December 15, 2019. The DNP student functioned as project facilitator by being present at the clinic to assist staff with the process designed change. Post implementation data were collected in February 18, 2020.

4. The DNP student continued data gathering through chart audit/review. Gathered data were used to evaluate the goal of the project. The following steps were carried out to achieve this goal. They were:

   - Monthly chart audits/review to gather key clinical data.

   - The DNP student made a list of patients whose annual dilated retinal exam results were not received. The compiled list were faxed to respective ophthalmology office for results to be faxed to the clinic for those who have completed the screening.

   - The MA, LPN, or the RN staff called/emailed patients who were yet to complete the annual retinal exam to help them set up ophthalmology appointment and to verify attendance of the appointment.

   - The DNP student provided feedback to site mentor for progress with the protocol for retinopathy screening.

   - The DNP student collected feedback from clinic staff including thorough informal interviewing during the data collection.

5. The DNP student provided the project final report to the organization as well as the educational institute by March 18, 2020. The DNP student will defend the project in April 1, 2020. Finally, a copy of the defense will be uploaded to Scholarworks by April 2020.

Data Collection and Management Procedures

The DNP student engaged in chart audit/review to collect data. The DNP student collected data independently on a monthly interval at the primary care clinic for a two months period. All data were provided through manual chart review because the reporting function from the EHR does not accurately capture ophthalmology reports right. All data were de-identified. The de-identified data were collected into REDCap in alignment with the organization's preferences and then exported to an Excel spreadsheet for statistical analysis. The de-identified data were sent to statistician to provide additional analysis.

Analysis of Data

The number of type 2 diabetes patients who satisfied the QI metrics for the annual dilated retinal exam between January 2019 and October 2019 in the primary care clinic were used for pre-implementation. Post implementation data were collected in February 2020. Data were analyzed with the use of fisher's exact test to compare cohorts pre/post implementation and illustrated through bar graphs. The project only included de-identified quantitative data.

Ethics and Protection of Human Subjects

To ensure ethics and protection of human subjects, the DNP student submitted a project application to the organization's IRB Committee for approval. The student proceeded with the project at the primary care clinic after the approval of the QI project from the organizational IRB. The purpose of this quality improvement project is to increase the occurrence of annual diabetic retinal exams among type 2 diabetes patients within a primary care clinic. All measures were ensured to protect patient health information in accordance with the Health Insurance Portability and Accountability Act (HIPAA). To ensure protection of patients, all data were de-identified, and data exchanged via the organization's encrypted email. The de-identified data

were collected into REDCap and then exported to an Excel spreadsheet for statistical analysis.

Evaluation of Results

The results were evaluated based on the data collected to answer the following clinical

questions: Can the number of type 2 diabetes patients who complete the annual retinal exam in a

Midwestern clinic be improved through (1) the implementation of a retinopathy protocol, (2) the

appropriate documentation of the completed retinal exam results in the EHR, and (3)

implementation and evaluation of an educational sessions intervention on Type 2 diabetes QI

metrics for DR?

Resources & Budget

The implementation of this project requires human and material resources. The human

resources required for this DNP project include provider time, DNP student (Project Manager)

time, case manager time, MAs/LPNs/RNs time, and ophthalmology office staff time.

The material resources needed for this project include printed educational materials for

staff, fax messages to ophthalmology office. A visual presentation of the budget for the DNP

project and time allocation is shown in Appendix I.

<center>**Results**</center>

The evaluation of the DNP project occurred throughout implementation and 60-days after

the start of the implementation. The retinopathy protocol will be considered if there is at least

20% increase in the number of type 2 diabetes patients who satisfy the annual dilated retinal

exam post-implementation. Education of RN/MAs/LPNs was evaluated two weeks after the

initiation of implementation through observation whether these clinicians know how to

document completed dilated retinal exams results that were sent to the clinic but were not

captured by the EHR.

Manual chart reviews were conducted to measure the number of patients whose results were sent to the clinic but were not appropriately documented, and those who were appropriately documented pre/post-implementation because the current EHR does not capture this.

A sample of fifty-seven type 2 diabetes patients were selected at random from the clinic. Pre-implementation chart review indicates that twenty-five retinal exam appointment results were sent to the clinic from ophthalmologist office. Twenty of 25 (80%) sent results were appropriately documented in the EHR pre-implementation. Twenty of 56 (35.71%) satisfied the quality metric for an annual dilated retinal exam pre-implementation as documented in the EHR. After evaluation of pre-implementation results, the DNP student focused education sessions on appropriate documentation of completed retinal exam results in the EHR. The DNP student also collated and faxed names of referred type 2 diabetes patients without documented dilated retinal exam results to ophthalmologist offices for results to be sent to the clinic.

The DNP student continued manual audit bi-weekly. After 60 days of implementation, data were collected via chart audit from a random sample of sixty-five type 2 diabetes patients in the clinic. Forty of 40 (100%) sent results were appropriately documented in the EHR post-implementation. Whereas 40 of 65 (61.54%) satisfied the quality metric for an annual dilated retinal exam post-implementation (Appendix J, figure 1). The remaining 25% did not satisfy the quality metric because of failure to schedule or attend their ophthalmology appointment.

The pre/post implementation results were compared with the Fisher's exact test probability. The post-implementation data showed an increase in the number of appropriate documentations of dilated retinal exam result in the EHR (Appendix J, figure 2; p-value of 0.0064). The low p-value of 0.0064 demonstrates that there is evidence to suggest that the proportion of completed documentation post implementation is significantly higher than the

proportion of those completed pre-implementation. Similarly, the p-value = 0.0064 shows that there is evidence to suggest that the proportion of satisfied quality metrics for an annual dilated retinal exam post-implementation is significantly higher than the proportion of those completed pre-implementation. With 20/25 of 80% completed pre-implementation and 40/40 of 100% completed post-implementation. The estimated relative risk of 0.8 suggests that the risk of recording the retinal exam results is 0.8 times lower in the pre group (or 20% lower).

95% CI of the relative risk which is the probability of appropriate documentation of ophthalmology results for the pre and post group is: 0.6576, 0.9732. Since the CI of the relative risk does not include 1.0, means we have evidence that the probability of appropriate documentation does differ for the pre and post groups. Therefore, we are 95% confident that the probability of appropriate documentation of the post groups is higher than that of the pre groups (See Appendix J, figure 2).

Discussion

There were improvements identified during the implementation period. All measures improved when compared to collected data from chart review prior to implementation. There was 25.83% increase in the number of patients who satisfied the quality metric for annual dilated retinal screening.

The DNP student found that the number of patients who have their retinal screening result sent to the clinic improved. Before the implementation of the retinopathy protocol, 25 of 56 patients have their retinal exam results sent to the clinic. However, after the intervention, 40 of 65 have their retinal exam results sent to the clinic. Also, before the intervention, 20 of 25 results sent to the clinic were appropriately documented. But after the implementation, 40 of 40 (100%) of results sent to the clinic were appropriately documented.

The improvement in retinal screening demonstrates the effectiveness of retinopathy protocol in the management of diabetes retinopathy in a primary care clinic. The improvement showed that retinopathy protocol was effective in increasing the number of type 2 diabetes patients who had their annual dilated retinal screening completed.

Limitations

The DNP project had several limitations related to the EHR QI software. The first limitation was that the EHR lacked the capability to determine if referral appointments were scheduled by patients, or whether scheduled appointments occurred until otherwise reported by the ophthalmology office. Because of this, it was difficult to obtain outcome data for scheduled ordered referrals and attended scheduled referral appointments for dilated retinal exams. Therefore, to measure the outcomes metric for the project, only the sent ophthalmology appointment report results and documented results in the EHR were evaluated.

The second limitation was the inability of the EHR to automatically audit and remove patients who were no longer seeking primary care visit in the clinic. Some of the type 2 diabetes patients had changed primary care clinic but the EHR still indicate that these patients were an active member of the clinic. This made it difficult to track the QI metric for dilated retinal screening in the primary care clinic. Thus, a manual chart audit was made to eliminate inactive patients pre-implementation of the project.

The third limitation was the inability of the EHR to query some received ophthalmology visit reports and to automatically document the results for completed dilated retinal exams. Hence, there was a manual chart review and documentation to satisfy the QI metric for an annual retinal screening for type 2 diabetes patients in the clinic.

Another limitation of the DNP project was related to the implementation timeline. During the implementation, the primary care clinic transitioned to a different EHR system. Though the final data collection took place 60 days post-implementation of the project, no activity occurred in the old EHR after 52 days of the post-implementation because of the transition process.

Conclusion

My primary goal for this DNP project was to improve patient outcomes and quality metrics for type 2 diabetes patients in underserved/immigrant population by increasing annual dilated retinal screening and to capture documentation of same in type 2 diabetic patients. The DNP project utilized the Burke-Litwin model as the conceptual model and explores the phenomenon of interest, improving the annual retinal exam among patients with type 2 diabetes. While the Donabedian model guided the interventions of this DNP project. The PDSA framework served as the implementation strategy to support the evidence-based interventions. The DNP project included the following interventions: First, the documentation of the completed retinal exam results in the EHR was used to satisfy the QI metric for annual dilated retinal screening. EHR documentation has the potential to provide feedback and motivation for the staff of the Midwest FQHC primary care clinic to make progress towards achieving the annual diabetic retinal exam screening as part of the management of diabetes retinopathy. Second, a retinopathy protocol was developed to educated clinic staff on appropriate documentation and follow up of diabetes retinopathy management. The diabetes retinopathy protocol allows the clinic staff to utilize a resource on improving annual dilated retinal exam. This protocol also served as a sustainable resource that will allow the clinic to continue to improve other HEDIS measures, and to also improve the QI metrics for annual dilated retinal screening.

The increase in annual dilated retinal screening demonstrated the effectiveness of retinopathy protocol in the management of diabetes retinopathy. Therefore, implementing a retinopathy protocol in primary care clinics will help improve the annual dilated retinal screening in type 2 diabetes patients.

Implication for Practice

The DNP project, increasing annual dilated retinal screening had implications for the underserved and immigrant population at the DNP project site, and the clinic staff at the primary care organization. The project site benefited from the ability to assess, measure, and evaluate the progress of the QI metrics for annual dilated retinal screening in order to improve quality of care for diabetes patients and reimbursement for the organization. Consistency of patient care with the utilization of evidence-based approach in the management of diabetes retinopathy can help to prevent blindness and other vision impairments through tight glycemic control, blood pressure, and lipid management, which positively impacts the outcome of health among type 2 diabetes patients. The QI project also contributed to the nursing discipline by demonstrating how a retinopathy protocol can improve annual retinal screening in an underserved/immigrant population. This DNP project demonstrated that the following interventions are effective in improving annual dilated retinal screening in underserved/immigrant primary care clinic sites: (1) the documentation of the completed retinal exam results in the EHR, and (2) implementation and evaluation of an educational sessions intervention on Type 2 diabetes QI metrics for DR. The nursing discipline benefited from the dissemination of a doctoral level perspective to address the problem of lack of compliance with the annual dilated retinal screening in type 2 diabetes patients. The implication, results, and successes of this DNP project were evaluated, as well as the limitations, sustainability, and dissemination.

Sustainability Plan

The DNP student worked closely with the practice manager and the site mentor to ensure sustainability of the project. Anticipated income from meeting HEDIS measures should incentivize sustainability. However, with the transitioning of the organization to a new EHR, there might be some challenges as the operation of the new EHR is yet to be fully understood by clinic staff and DNP student.

The process of how to satisfy the DR quality metric in the new EHR was evaluated so that the protocol could be adapted to meet the QI metric. However, the new EHR is still work in progress and the super-users are yet to figure out how the process of satisfying the various quality metrics will occur. Therefore, the evaluation of this QI process incorporating the new EHR will be a suitable project for another DNP student to continue with the goal of using the current protocol to improve the quality of care for DM patients and to satisfy the required annual dilated retinal exam screening in type 2 diabetes patients.

Dissemination Plan

The dissemination of the DNP project included outcomes that are related to implementation of retinopathy protocol through the following interventions: (1) the appropriate documentation of the completed retinal exam results in the EHR, and (2) implementation and evaluation of an educational sessions intervention on Type 2 diabetes QI metrics for DR. The outcomes of the retinopathy protocol were disseminated to the university, the organization in which the DNP project was conducted, and the general academic nursing community. The DNP student presented the outcome to the organizational leaders and stakeholders of the DNP project site to assist with the establishment of a sustainability plan. The final DNP project was also submitted to the university and to ScholarWorks for publication. The outcomes were presented at

the Grand Valley State University Three Minutes Thesis (3MT) Competition. The outcome will

also be presented at the Midwestern Association of Graduate Schools (MAGS) 3MT. The

dissemination of this DNP project contributed to the nursing discipline by demonstrating how the

use of retinopathy protocol helped to address the problem of lack of compliance with the annual

dilated retinal screening in type 2 diabetes patients. The DNP student may also submit the

outcomes of the DNP project for presentations at various nursing or primary care conferences in

order to assist other underserved and immigrants' clinical sites with improving annual dilated

retinal screening in type 2 diabetes patients.

Reflection on DNP Essentials

Essential 1: Scientific Underpinnings for Practice

To address this DNP essential, it is important to use scientific evidence-based

interventions to improve practice (AACN, 2006). The DNP student achieved this essential by

exploring and applying current evidence-based framework, literature, and practice standards to

improve patient care. The DNP project also used current evidence-based frameworks to evaluate

the current practice methods within the underserved/immigrant Midwestern primary care clinic

where the project is implemented. The exploration and evaluation process provided the

opportunity for the DNP student to develop new practice approaches for clinicians to improve

retinal screening in type 2 diabetes patients. The quality of care at this primary care clinic was

improved through the application of evidence-based guidelines to manage diabetes retinopathy.

Essential 2: Organizational and Systems Leadership

This essential requires the DNP student to develop, improve, and utilize leadership skills

to improve quality of care and patient safety (AACN, 2006). A comprehensive organizational

assessment was carried out to analyze the multicomponent issues related to the low annual retinal

screening in the primary care clinic. This led to the analysis of the organizational structure from the macro and micro-system levels. The information gathered was used to develop the DNP project proposal and intervention design. There was improvement in quality metric which could bring increased reimbursement for the organization.

Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

This DNP essential is enacted when the DNP student uses analytical approach to implement current research and science into evidence-based practice in order to solve healthcare issues (AACN, 2006). The DNP student achieved this competency in the project through the research of pertinent literature and review. The literature review was based on current evidence and included QI approaches to guide the DNP project design and evaluation. The DNP student also used information technology to acquire quality indicator from the EHR for the analysis and evaluation of the project outcomes. Analytical and statistical methods were also used to evaluate the outcome of the DNP project. The improvement in QI metric for dilated retinal screening was statistically significant after the implementation of evidence-based interventions.

Essential IV: Information Systems Technology

This essential requires the DNP student to demonstrate the abilities to use information systems and technology to support and improve patient care at various levels of care (AACN, 2006). The DNP student achieved this essential using the organization's EHR for manual chart review to gather pre/post-implementation data for the project. The student used fax to communicate with stakeholders for retinal exam results to be sent to the clinic. Emails were also used to communicate with mentor to gather data and report updates on the progress of the project. Data were organized into excel spreadsheet for analysis. The DNP student observed the organization's policy to ensure strict confidentiality of data.

Essential VI: Interprofessional Collaboration

This essential requires the DNP student to collaborate with the different members of the interprofessional team to address organization issues (AACN, 2006). The student attained this essential through interprofessional collaboration with the practice manager, medical providers, care manager, RNs, LPNs, MAs, and ancillary staff. The student also collaborated with the staff at the ophthalmology office to gather result of completed retinal exam. During the evaluation of the outcome, the student collaborated with statistical expert to determine outcome of the project. Collaborating with the different members of the interprofessional team helped the student in to understand the current state of the organization, develop appropriate intervention, and evaluate interventions.

Essential VII: Clinical Prevention and Population Health

The DNP student must be able to promote health and prevent diseases at the individual and population level (AACN, 2006). The DNP project focused on prevention of complications of diabetes retinopathy. Failure to identify and manage diabetes retinopathy early can lead to various vision impairment, including blindness. Thus, early identification through screening can help to provide tight glycemic control, blood pressure and lipid management in order to prevent blindness among type 2 diabetes patients. Thus, the development of a retinopathy protocol to help improve annual retinal screening to promote health for type 2 diabetes patients. The effectiveness of the retinopathy protocol helped the student to achieve health promotion and disease prevention for type 2 diabetes patients.

Essential VIII: Advanced Nursing Practice

This essential requires the student to demonstrate and apply advanced nursing practice knowledge to improve health outcome for patients (AACN, 2006). The DNP student achieved

this essential by developing a process to improve annual retinal screening required of type 2

diabetes patients. The student also supported other clinicians on appropriate documentation of

retinal exam results. The student was able to carry out this quality improvement project because

of the advanced nursing knowledge received through the DNP program.

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Appendix A

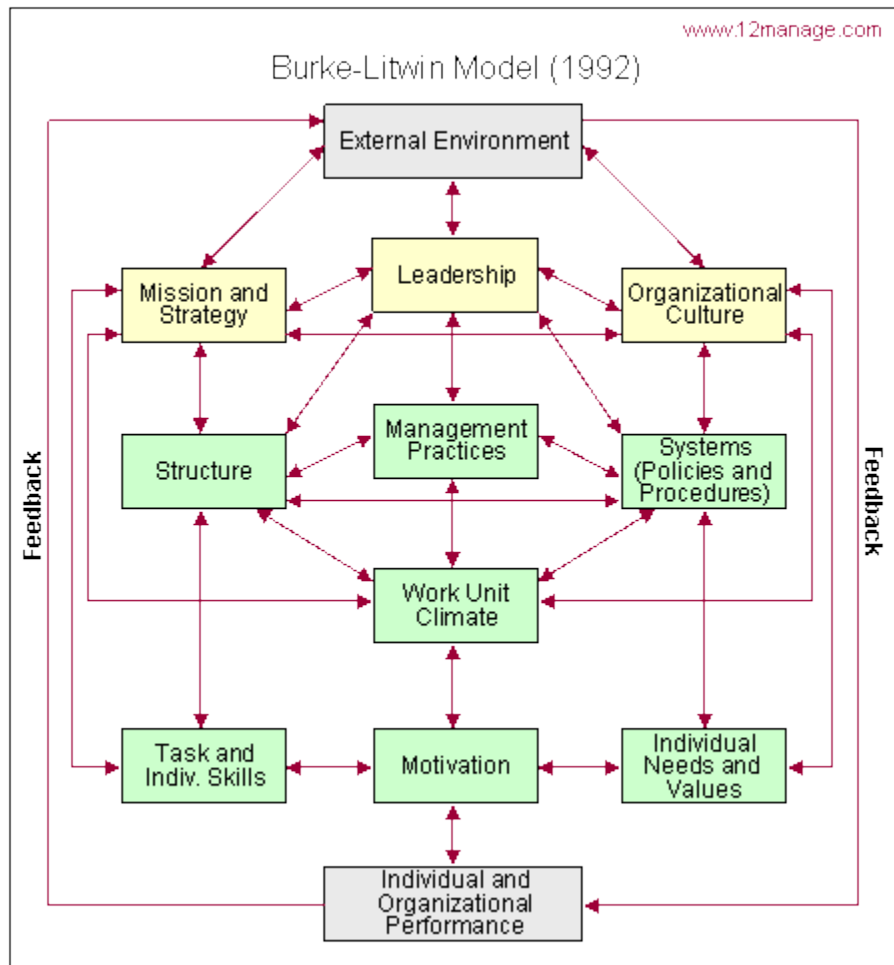Burke-Litwin Causal Model of Organizational Performance and Change

Figure A: The Burke-Litwin Model. Adapted from: Burke, W. W. & Litwin, G. H. (1992). A

causal model of organizational performance and change. *Journal of Management, 18*,

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Appendix B

Donabedian's Model

Figure B: University of South Australia. (n.d.). *EBP step 5*. Retrieved from

https://www.unisa.edu.au/Research/Health-Research/Research/Allied-Health-

Evidence/Resources/Evidence-based-Practice-Online/EBP-Online-Step-5/

Appendix C

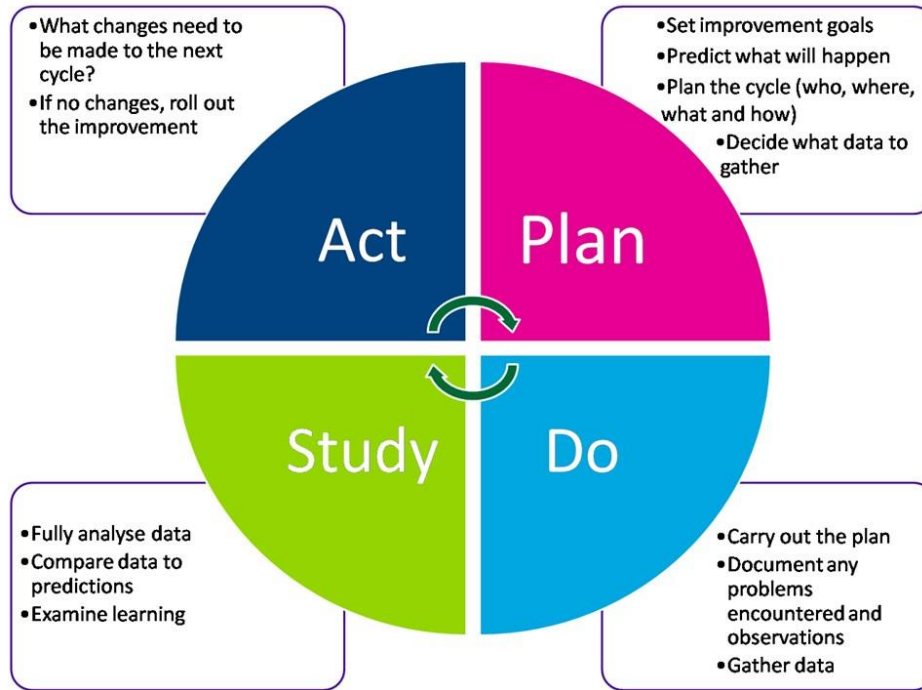Plan, Do, Study, Act Implementation Model

Figure B. Health Improvement Scotland. (2019). *Plan do study act*. Retrieved

from: https://ihub.scot/project-toolkits/diabetes-think-check-act/diabetes-think-check-

act/getting started/plan-do-study-act/

Appendix D

SWOT Analysis of Midwest Primary Care Clinic

SWOT Analysis	
Strengths	**Weaknesses**
- Part of a large healthcare system in midwest – nation's second largest Catholic health system - Clearly defined values, vision, mission, and strategic plan - Strong teamwork - Dedicated employees who strive to help the underserved and immigrant population - Centrally located around the underserved population - FQHC status	- High managers and providers turnover - Lack of staff knowledge on how to satisfy quality measures - Not having ophthalmology office within practice or easily accessible - Manual audit/documentation of consult result - Lack of office scheduling of ophthalmology appointment - The organization is at the verge of transitioning to a new EHR
Opportunities	**Threats**
- Increase reimbursement for the organization - Innovation and technology development to fully utilize the tools available in the EHR - Support of DNP student for quality improvement project	- Competition with two health organizations in the neighborhood - Some ophthalmologist do not send referral results until they are prompted to do so - Failure to adhere to ophthalmologist referral

Figure C: SWOT Analysis of Midwest Primary Care Clinic

Appendix E

PRISMA Diagram

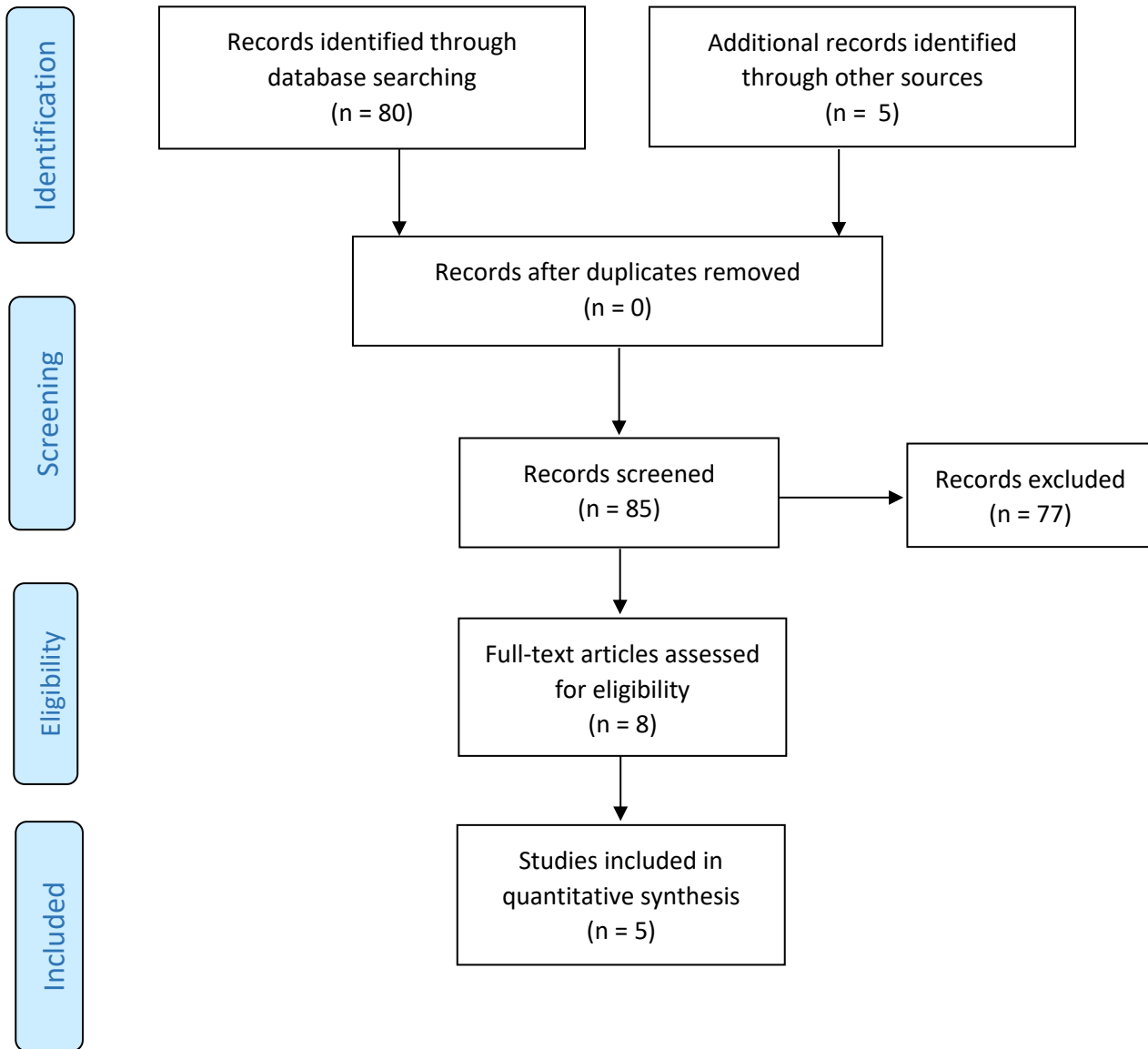**PRISMA 2009 Flow Diagram**

Figure D: Adapted from "Preferred reporting items for systematic reviews and meta-analyses:

the PRISMA statement," by D. Moher, A. Liberati, J. Tetzlaff, D. Altman, and PRISMA Group.
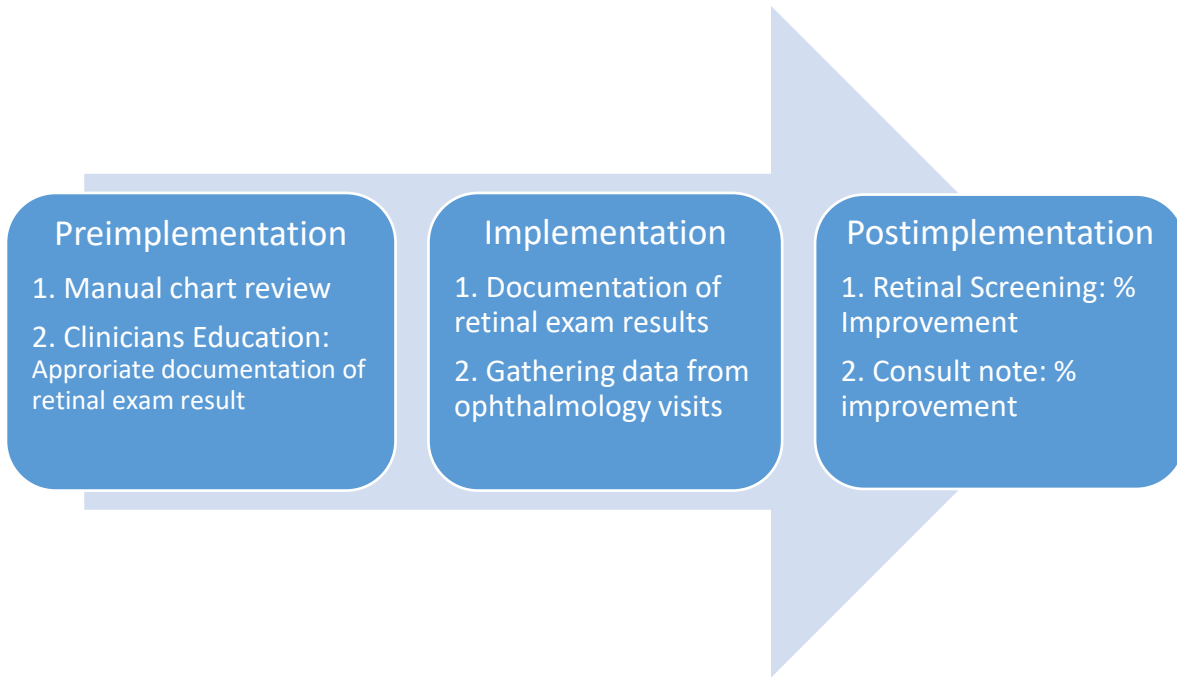
Copyright 2009 by PLoS Medicine.

Appendix F: Literature Synthesis Table

Author (Year) Purpose	Design (N)	Inclusion Criteria	Intervention vs Comparison	Results	Conclusion
Vuokko, Mäkelä-Bengs, Hyppönen, Lindqvist, & Doupi, 2017	Systema-tic review	Studies on documentation of data in EHR	12 step systematic review with intervention targeted at the implementation of structured documentation (commonly agreed patient documentation in the EHR) in comparison to free-text patient data group for the perspective of secondary use of data.	Structured documentation was found to produce a more complete and reliable patients records in comparison to free-text patient data for patients.	Although structured documentation contributes to complete and reliable records, there is limited evidence to demonstrate that structured documentation results in a higher quality of care.
Hemo, Shahar, Geva, & Heymann, 2018	Retrospe ctive cohort study	The study focuses on type diabetes patients, and quality of care measures.	The use of a diabetes registry to evaluate the quality of care measures to determine if there is an improvement in the quality of care among diabetes patients.	Due to a better recording via the diabetes registry, there was an improvement in the performance of quality of care measurement test over the period of the study. BMI, blood pressure, foot care, and fundus exam improved significantly during the period of the study.	The use of a diabetes registry leads to improvement in quality measures and a reduction in mortality among diabetes patients.
Han, Sharman, Heider,	Cross-sectional survey/re	Study focus on type 2 diabetes patients, and	A practice assessment survey of 50 ambulatory	The meaningful use of the EHR through disease registries	The meaningful use of EHR resulted in improvement in

Maloney, Yang, & Singh, 2016	trospective cohort study	on documentation of data in EHR.	practices was conducted to determine how practices were using diabetes registries, and insurance claim data were used to compare the health outcomes for practices that used diabetes registries.	associated with 6% improvement in laboratory testing and dilated retinal exams; and decrease hospitalization and ED visit.	the quality of care for patients.
Jung, Unruh, Vest, Casalino, Kern, Grinspan, . . . Kaushal, 2017	Retrospective cohort study	Meaningful use of EHR	The evaluation of the impact of outpatient physician participation in meaningful use of EHR on the quality of care provided to Medicare fee-for-service enrollees.	Meaningful EHR use was associated with higher odds of colorectal cancer screening. There is no associated reduction in ambulatory care sensitive conditions, diabetes retinopathy screening, diabetes nephropathy screening, or influenza vaccinations.	The participation of providers in meaningful use of EHR was not associated with significant improvement on all four quality measures of the study.
Esper, & Walker, 2015	Retrospective cohort study	EHR and quality measures	The evaluation of documentation of specific quality oncology practice initiation measures before and after an educational intervention.	The preintervention chart audits found less than 80% compliance in measurements areas, whereas the postintervention demonstrated remarkable improvement in all areas addressed during the educational intervention.	Increasing the knowledge of documentation and providing tools to increase the efficiency of documentation lead to improved quality of patient care.

Appendix G

Retinopathy Protocol Pathway

Preimplementation

1. Manual chart review

2. Clinicians Education: Approriate documentation of retinal exam result

Implementation

1. Documentation of retinal exam results

2. Gathering data from ophthalmology visits

Postimplementation

1. Retinal Screening: % Improvement

2. Consult note: % improvement

Appendix H

Monthly Project Timeline

September	October	November	December	January	February
IRB Application 9/15	IRB approval 10/24	Proposal 11/15	Continue monthly audits/review	Continue monthly audits/review	Defend project 2/28
Meeting with Practice Manger	Chart audit/review	Staff Education	Data collection	Complete data collection	Submit to scholar works
Meeting with Provider	Staff Education	Go Live	Proposal Presentation	Write project defense	Enhanced Recovery Meeting(s)

Appendix I

Proposed Project Budget

Initial Cost: Doctor of Nursing Practice Project Financial Operating Plan	Cost
Revenue	
Project Manager Time, 125 hours (in-kind donation)	$5,625
Team Member Time (in-kind donation):	
Provider (Site Mentor)	$625
RN Care Manager	$90
Medical Assistant	$150
Consultation Time (in-kind donation):	
Ophthalmology office	$200
Statistician	$100
Cost Mitigation	
Additional reimbursement for clinic	$4,500
Total Income	$11,240
Expenses	
Project Manager Time (in-kind donation)	$5,625
Team Member Time (in-kind donation):	
Provider (Site Mentor)	$625
RN Care Manager	$90
Medical Assistant	$150
Consultation Time (in-kind donation):	
Ophthalmology office	$200
Statistician	$100
Printed Materials/Fax/Copy (in-kind donation)	$150
Organizational Materials and Functional Space Use	$150
Education Session	$50
Total Expenses	$6,940
Net Operating Plan	$4,300

Appendix J

Figure 1: Descriptive Statistics

Inclusion Criteria:
- Patients at the clinic who had a retinal exam appointment referral.

	Pre-Implementation	Post-Implementation
Retinal exam appointment referral was ordered by the physician	56	65
Completed exam appointment result was sent to the clinic	25	40
Received appointment result was documented in the patient's EHR	20	40

Figure 2: Was there an improvement in appropriate documentation of completed retinal exam results sent from the retinal exam office in patients' EHRs?

Table of Group by report_doc			
Group(Group)	report_doc(Was the appointment documentation documented in the patients EHR?)		
Frequency Row Pct	No	Yes	Total
Pre-Implementation	5 20.00	20 80.00	25
Post-Implemantation	0 0.00	40 100.00	40
Total	5	60	65

Fisher's Exact Test	
Table Probability (P)	0.0064

Odds Ratio and Relative Risks			
Statistic	Value	95% Confidence Limits	
Relative Risk (Column 1)	0.8000	0.6576	0.9732
One or more statistics not computed -- zero cell.			