

Mississippi University for Women

ATHENA COMMONS

DNP Projects

College of Nursing & Health Sciences

2022

Improving Primary Care Providers' Assessment of Type 2 Diabetic Patients

Jasmine Granger

Follow this and additional works at: <https://athenacommons.muw.edu/dnp>



Part of the [Public Health and Community Nursing Commons](#)

Improving Primary Care Providers' Assessment
of Type 2 Diabetic Patients

by

Jasmine Granger, FNP-BC

A Project
Submitted in Partial Fulfillment of the Requirements for the
Degree of Doctor of Nursing Practice
College of Nursing and Health Sciences
Mississippi University for Women
Columbus, Mississippi

Graduate Committee Approval

The Graduate Committee of Jasmine Granger
hereby approves her research project as meeting partial
fulfillment of the requirements for the Degree of
Doctor of Nursing Practice

Date _____

Approved _____
Chair

Approved:

Director of Graduate Studies

Copyright © 2022 Jasmine Granger
All rights reserved. No part of this work may be reproduced, stored in a retrieval system,
or transmitted, in any form or by any means, electronic, mechanical, photocopying,
recording or otherwise, without author's prior written permission.

Improving Primary Care Providers' Assessment of Type 2 Diabetic Patients

Jasmine Granger, FNP-BC

Mississippi University for Women, 2022

Supervising Faculty: Dr. Sally Pearson

Abstract

Type 2 diabetes is the most common form of diabetes and affects millions of Americans. Type 2 diabetes leads to many chronic medical conditions if not properly managed. Often, primary care providers (PCPs) deliver care to type two diabetic patients; therefore, it is imperative that PCPs are knowledgeable of current American Diabetes Association (ADA) guidelines. The purpose of this Doctor of Nursing Practice (DNP) project was to determine if implementation of a type 2 diabetes' assessment algorithm improved PCP's knowledge and compliance of ADA assessment guidelines. Educational sessions were conducted at clinics within Mississippi and Tennessee. A pre-test was administered, and immediately following the educational session, participants completed a post-test. Participants were given two to three months to implement changes in their clinical practice prior to the administration of the Post Education Self Evaluation questionnaire. Descriptive and inferential statistics were utilized to compare samples. It was determined that there was not a statistically significant increase in knowledge regarding the assessment of type 2 diabetic patients following the sessions ($p=0.479$). Since the knowledge of the recommendations was adequate, 92% of the participants reported an increase in following the guidelines because of the educational session. This project supports the need for continued education for healthcare providers regarding guidelines such as these in order to improve quality of care for the diabetic population.

DEDICATION

I dedicate this project to my loving family. To my parents, thank you for always being my support system. You all have literally been there every step of my journey to motivate me as well as my prayer warriors. There is no way I would be the woman I am today without the two of you. Mom, you have been my role model my entire life. Witnessing you as a nurse and your passion for caring for others has inspired me in so many ways. To my best friend, Jalisha, thank you for encouraging me and being my listening ear. We have motivated each other throughout this entire program. We have kept each other from throwing in the towel numerous times. I love you forever. To my special friend, Derrick, you have been there to provide your love, encouragement, prayers, a shoulder to cry on, and simply a listening ear. Words do no justice to describe how grateful I am for having you in my life.

To my fellow DNP classmates, this journey has not been the easiest, but WE ROCKED IT! We have witnessed each other grow as providers throughout these two years. You all are great healthcare providers, and I wish you all well. Thank you for a great two years!

ACKNOWLEDGEMENTS

I would like to express my appreciation for the entire department of the DNP program. I would like to especially thank the professors of this program for their support and guidance, Dr. Alena Lester, Dr. Shonda Phelon, Dr. Beth Turner, and Dr. Sally Pearson. Dr. Pearson, thank you for being a great advisor throughout this program. Your guidance has led to my success in the DNP program. To Dr. Shanika Ford, thank you for all of your advice and tremendous amount of help. You have not only served as my project mentor for this program, but you have also been my personal mentor throughout my entire nursing journey. No matter the time of day, you are always there to provide your expertise. Thank you!

TABLE OF CONTENTS

TITLE PAGE	1
COPYRIGHT PAGE	3
ABSTRACT	4
DEDICATION	5
ACKNOWLEDGEMENTS	6
TABLE OF CONTENTS	7
LIST OF FIGURES	9
LIST OF APPENDICES	10
Background of the Problem	11
Measures of the Disease	11
Diabetes' Occurrence	12
Statement of Purpose	13
Project Significance	13
Objectives/Goals	13
PICOT Question	14
Defined Terms	14
Population and Setting	16
Review of Literature	16
Search Strategy	16
Literature Synthesis	17
Conceptual/Theoretical Framework	20
Project Implementation/Methodology	22

Plan	22
Do.....	23
Study	23
Act.....	23
Tools/Instrumentation.....	23
Evaluation Methods	24
Timeline	24
Results of the Project	25
Participants.....	25
Outcomes	26
Pre-test versus Post-test	27
Impact of Experience	29
Three-month Follow-up.....	30
Project Limitations.....	31
Implications & Recommendations.....	31
Nursing.....	32
Nursing Education	32
Community	32
Project Budget/Cost	32
References	34

LIST OF FIGURES

Figure 1: Nurse Practitioner Experience.....	26
Figure 2: Pre-test versus Post-test:.....	27
Figure 3: Post Education Self-Evaluation Questionnaire	30

LIST OF APPENDICES

Appendix A: Algorithm for the Assessment of Type 2 Diabetes	38
Appendix B: IRB Approval	39
Appendix C: Search Strategy Map	40
Appendix D: Pre-test Questionnaire	41
Appendix E: Post-test Questionnaire	43
Appendix F: Post Education Self-Evaluation Questionnaire	44

Improving Primary Care Providers' Assessment of Type 2 Diabetic Patients

Background of the Problem

Diabetes contributes to early morbidity and mortality affecting 30.3 million Americans (Shawley-Brzoska & Misra, 2018). Type 2 diabetes leads to further complications. Thus, it is important to correctly assess the patient's routine labs and offer proper management of diabetes such as completing foot assessments, checking weight, monitoring A1c levels, checking for urinary albumin, and asking about annual eye exams. Without proper assessment, type 2 diabetes can cause preventable complications such as vascular complications and can then lead to lower extremity amputation. Diabetic patients have an increased risk of having a stroke, heart attack, foot ulcers, infection, limb amputation, and kidney failure (Wexler, 2021).

Clinicians often lack knowledge of recent guidelines, but it is the providers' responsibility to remain up-to-date with the continuous changes of treatment guidelines. Providers as well as patients with limited knowledge and skills place a limitation on achieving glycemic, blood pressure, and cholesterol goals. Providers often experience difficulty keeping up with the constant changes of recommendations (Rushforth et al., 2016).

Measures of the Disease

Screening for type 2 diabetes should be routine for adults ages 45 and older according to The American Diabetes Association. It is also recommended that women who have had gestational diabetes, people younger than 45 who are overweight or obese and have one or more risk factors associated with diabetes, people who have been diagnosed with prediabetes, or children who are overweight or obese and who have a family history of type 2 diabetes or other risk factors. Type 2 diabetes is usually

measured using a glycated hemoglobin (A1C) test, which measures blood sugar levels for the past 3 months. An A1C level of 6.5% or higher on two separate tests can be used to diagnose diabetes. Type 2 diabetes can also be measured by random blood sugar tests, fasting blood sugar tests, or oral glucose tolerance tests (Mayo Clinic Staff, 2021). Once a patient has been diagnosed, it is imperative to continue monitoring the patient during each visit to avoid complications. This includes A1C levels, foot exams, eye exams, cholesterol levels, kidney function, weight, and blood pressure.

Diabetes' Occurrence

The prevalence and incidence of type 2 diabetes continues to increase as a leading cause of human suffering and deaths. African Americans, Hispanic/Latino Americans, American Indians, and Alaska Natives are at a higher risk of developing diabetes. Young adults are being diagnosed with type 2 diabetes at a high rate due to obesity, smoking, dyslipidemia, or sedentary lifestyles (Kosiborod et al., 2018).

In 2017, more than one million deaths were a result of type 2 diabetes, which ranks as the ninth leading cause of mortality. Complications of type 2 diabetes lead to early morbidity and mortality. Death amongst diabetics younger than 55 are higher as a result of poor control of blood sugar levels. Cardiovascular disease is one of the leading causes of death in type 2 diabetic patients. Coronary artery disease (8.2%), heart failure (3.3%) and stroke (2.2%) contribute to the macrovascular complications of type 2 diabetes. Peripheral neuropathy (7.7%), chronic kidney disease (5.0%), and albuminuria (4.3%) contribute to the microvascular complications of type 2 diabetes (Kosiborod et al., 2018).

Statement of Purpose

The purpose of this project was to promote the use of ADA assessment guidelines in a primary care clinic setting. The PCPs should be compliant with screening, assessments, and follow-up recommendations to prevent complications of type 2 diabetes. For the purpose of this project, primary care providers were educated and provided with an algorithm to improve the assessment of type 2 diabetic patients. The algorithm consisted of a proper timeline for foot assessment, A1C levels, eye exams, lipid panels, and kidney function tests. The project assessed the baseline knowledge of primary care providers as well as follow-up on the effectiveness of the education of the providers.

Significance

“Currently, 415 million people have diabetes mellitus (DM) with worldwide prevalence of 8.8%. By 2040, it is predicted that about 227 million people will have developed new cases of the disease” (Saraiva Lucoveis et al., 2018, p. 3042). Healthcare providers play a critical role in helping patients properly manage diabetes. Whether this includes monitoring A1c levels, referring the patients to certain specialties, or educating the patients, the providers contribute to the patients’ care. Most patients with type 2 diabetes are treated by their PCP; therefore, it is important that providers are consistently utilizing continuing education that includes assessment and management skills. Providers may be able to address a concern before complications arise.

Goals/Objectives

The objectives of this project were to provide primary care providers with an easily assessable tool in order to assess diabetic patients and to improve the assessment of type 2 diabetic patients at the appropriate visit. Providers often find it challenging to

recall the changing recommendations (Rushforth et al., 2016). The goal was to improve the care of type 2 diabetics by monitoring eGFR, A1C levels, lipid levels, performing monofilament testing, and recommending eye exam. By improving the assessment of these patients, further complications can be prevented. Early detection of complications by screening patients may delay or even prevent the development of target organ disease. Providers must perform foot exams in order to check the blood flow and sensation in diabetic patients' feet, which should begin at the time of diagnosis. Eye exams must be performed in order to prevent retinopathy or to manage the condition in order to preserve vision. Providers must monitor kidney function to prevent chronic kidney disease or kidney failure. Cholesterol and triglyceride levels must be monitored to prevent or decrease risks of heart attacks, strokes, or even death (Wexler, 2021). Therefore, it is extremely important to encourage providers to correctly assess type 2 diabetic patients at the appropriate visit. The main objective of this project was to provide primary care providers with a resource guide on when to assess type 2 diabetic patients and what to assess.

PICOT Question

Does implementation of a type 2 diabetes' assessment algorithm improve PCP's knowledge and compliance of ADA assessment guidelines?

Defined Terms

Terms to be defined include implementation, type 2 diabetes, assessment algorithm, PCP, knowledge, compliance, and ADA guidelines.

- Implementation is “the carrying out of planned, intentional activities that aim to turn evidence and ideas into policies and practices that work for people in the real

world” (The Centre for Effective Services, 2021). Implementation is executing a plan or idea.

- Type 2 diabetes occurs when the body becomes impaired to regulation and uses glucose as a fuel (Mayo Clinic Staff, 2021). Type 2 diabetes results when the body no longer produces adequate insulin in order to function properly.
- An assessment algorithm is developed to provide clinicians with a practical guide that considers evidence-based approaches to assessment (Garber et al., 2019). An algorithm may be used to provide screening guidelines as well as treatment recommendations. The assessment algorithm was used as a tool to aid in the assessment of type 2 diabetic patients. PCPs are primary care providers such as physicians, clinical nurse specialist, nurse practitioners, or physician assistants that coordinate a patient’s health care needs (American Academy of Family Physicians, 2021). PCPs that were evaluated in this study were nurse practitioners caring for type 2 diabetic patients.
- Merriam-Webster, Incorporated (2021) defines knowledge as “acquaintance with or understanding of a science, art, or technique”. Knowledge refers to the information a person retains through education or experience.
- Compliance is “the process of following rules, regulations, and laws that relate to healthcare practices” (PowerDMS, 2020). Compliance can be defined as following rules or standards that have been set forth.
- The American Diabetes Association [ADA] (2021) guidelines provide providers, patients, policy makers, researchers, and others with the most current evidence-based recommendations for diabetes care, general treatment goals, and tools to

evaluate patients. ADA guidelines are a set of standards created by the American Diabetes Association in order to properly manage diabetes.

Population and Setting

The target population was all PCPs who provide care to type 2 diabetic patients. The setting of this study was conducted in different clinic settings. The accessible population consisted of nurse practitioners (NP) who agreed to participate in the educational session and complete the brief questionnaires. The educational sessions took place in the clinic settings such as provider offices and break areas for personal education sessions. The goal was to utilize a variety of sessions and settings to aide in improving sample size. The clinics included Outreach Health Services located in Heidelberg and Shubuta, Mississippi and The Little Clinic, which includes the Memphis region.

Review of Literature

Search Strategy

The purpose of designing a research project is to utilize evidence to adequately address the research problem. The researcher must first determine what is wished to be achieved from the project. It is important to search and review the current literature relevant to the project to determine what is already known and what studies have already been done.

To aid in this search, internet search engines were good choices. Google scholar was used to explore articles related to type 2 diabetes for this research project. Studies, guidelines, and recommendations reviewed for this study were published from 2016 to present.

The keywords entered were implementation, type 2 diabetes, assessment algorithm, PCP, knowledge, compliance, and ADA guidelines. The original search using type 2 diabetes resulted in approximately 863,000 articles. By adding more specific terms, only viewing peer-reviewed sources, and limiting years of publication from 2016-2022, the researcher was able to narrow the search to a smaller volume of literature that was more pertinent to the current study (see Appendix C for Search Strategy Key Terms).

Literature Synthesis

As mentioned above, numerous studies were reviewed while researching the assessment of type 2 diabetes. The literature explores variables connected with diabetes and provides evidence of the need for a better approach to controlling health impact, including treatment. Several sources examined interventions to reduce diabetes prevalence.

Murchison et al. (2017) focuses on factors that impact diabetic patients' adherence to eye care follow-up. This study was completed in four years on 1,968 diabetic patients to evaluate their adherence. The study showed that 42.6% of diabetic patients actually followed-up for their initial eye exam. A patient's ethnicity and insurance status were a factor in a patient's compliance. Patients with Medicare have the highest adherence rates, whereas Medicaid patients had the lowest adherence. Distance also contributed to adherence. Patients residing more than 10 miles from a healthcare facility were shown to have elevated A1C levels. Smokers are less likely to follow eye care recommendations due to not having an understanding of the importance of eye exams. This study shows that early identification and regular eye exams can prevent diabetic retinopathy. The American Academy of Ophthalmology recommends dilated

fundus examinations yearly but more frequently for advanced diabetic retinopathy (Murchison et al., 2017). Therefore, it is imperative that primary care providers are recommending regular eye examinations.

The study by Kosiborod et al. (2018) included patients from primary and specialist healthcare settings to assess the prevalence of vascular complications in 15,992 type 2 diabetic patients. Microvascular and macrovascular complications were both assessed. Microvascular complications include nephropathy, retinopathy, and neuropathy. Macrovascular complications include coronary artery disease, cerebrovascular disease, peripheral artery disease, heart failure, and implantable cardioverter defibrillator use. Results showed that 18.8% of patients had macrovascular complications. 12.7% of patients developed microvascular complications. “Our findings highlight a key opportunity for improved monitoring of complications, and the importance of early and aggressive risk factor modification” (Kosiborod et al., 2018). It is important to assess patients for neuropathic changes and nephropathic function at the appropriate time.

The risk factors of lower extremity amputations in type 2 diabetic patients were examined by Shatnawi et al. (2018). 225 type 2 patients were included in the study. 76.9% of patients had evidence of infection in the lower extremity. 45.3% of patients had ulcers of the feet. Risk factors found to cause higher incidence of lower limb amputation included at least 15 years of diabetes diagnosis, A1C level of 8 or more, patients on insulin, patients with chronic renal impairment, patients with hypertension, patients with history of stroke, patients with gangrene, and patients with cardiac diseases. Monofilament tests were used to characterize the foot ulcers (Shatnawi et al., 2018). This

study emphasized the importance of PCPs completing monofilament tests following ADA guidelines.

Webb, Rheeder, and Wolvaardt (2019) assessed the ability of primary care clinics to provide quality diabetes care. Twelve primary healthcare clinics were audited based on national treatment guidelines. Results showed that none of the twelve clinics had monofilaments available. All twelve clinics had scales and blood pressure cuffs available. Eleven of the clinics had some type of diabetes guideline available in their clinic. None of the clinics had nutrition advisors. Utilizing the correct equipment, supplies, and material are all vital in providing care to type 2 diabetic patients. If the clinics are not provided with equipment needed to manage diabetes, the patients suffer as a result. Evidence-based clinical guidelines provide PCPs with standards of care to integrate into daily practice with a specialist readily available (Webb, Rheeder, & Wolvaardt, 2019).

In the Rushforth et al. (2016) systematic review, 32 studies were included: 17 address general diabetes care, 11 glycemic control, three blood pressure, and one cholesterol control. Providers complained that it was difficult to convince patients to make changes. Physicians also found it difficult to keep up with the evolving recommendations or even recall what the recommendations are. Some providers lacked confidence in necessary treatment changes. PCPs stated that there was not always someone to ask for advice nor any protocols in place. Rushforth et al. (2016) concluded that clinicians are experiencing anxiety and uncertainty related to treating type 2 diabetes. The providers in this study would most likely benefit from an assessment and a treatment algorithm to provide directions on caring for type 2 diabetic patients.

Rawshani et al. (2017) discussed the excess risk of death and cardiovascular disease in type 1 and type 2 diabetic patients. A total of 36, 869 patients with type 1 diabetes and 457, 473 patients with type 2 diabetes were included in this study. Patients were shown to be managed properly, which led to a 40% reduction in cardiovascular complications in type 1 diabetics and a 40% reduction in patients with type 2 diabetes. Mortality rates also decreased as well. Hospitalization rates for patients with coronary heart disease, acute myocardial infarction, hypertension, and the rate of macroalbuminuria decreased among patients with type 1 and type 2 diabetic patients when potential complications were prevented (Rawshani et al., 2017).

Erwin, Pitlick, and Peters (2015) conducted a study regarding management of blood pressure, A1C levels, and cholesterol in patients with diabetes after discharge from a pharmacist-managed ambulatory clinic. The study showed that 69 patients who were discharged from an ambulatory clinic after meeting their blood pressure, A1C, or LDL cholesterol goal failed to maintain that goal. 35 patients failed to maintain LDL cholesterol goals, 22 failed to maintain A1C goals, and 42 patients failed to maintain systolic blood pressure. The majority of these patients were elderly, obese men. This study demonstrated that as long as patients were being managed by pharmacists within the ambulatory clinic, they met their goals. Once the patients were discharged, they failed to maintain clinical goals (Erwin, Pitlick, & Peters, 2015). Patients are dependent on their providers for managing their diseases.

Conceptual/Theoretical Framework

Nursing theories help define nursing care and provide a foundation for clinical-decision making. Nurses can utilize nursing theories and models to improve quality of

care and patient outcomes. Nursing theories and models guide nurses in asking the correct questions and in understanding how to process the information. Patricia Benner introduced the *From Novice to Expert* model in 1982 as it relates to nurses' clinical experience (Ozdemir, 2019).

Patricia Benner's model *From Novice to Expert* served as the framework for this scholarly project. Through this framework, processes were assessed to determine compliance with current recommendations for treatment. This project allowed for improvements if needed in the primary care clinic processes to ensure exceptional evidence-based patient care. Dr. Benner's Novice to Expert theory "stands on how a nurse develops nursing knowledge, skill, clinical competence and comprehension of patient care through complete theoretical training and experiential learning from novice stage to expert stage" (Ozdemir, 2019, p. 1280). This model facilitates learning and acceptance of change from beginning to end. Dr. Benner introduced five levels of advancement. Each level is discussed below in relation to this project.

Novice, the first level, is described as the beginning. Providers must understand their current practice and why diabetes is significant in the community. This scholarly project focused on current practice and the move towards complying with the current recommendation for diabetes treatment. Once the level of novice has been achieved, movement to the second level is warranted. The second level is signified as advancement. Advancement is accomplished with the understanding of current practice and why treatment is pivotal. At the advancement level, providers are aware of what the current evidenced-based diabetes treatment guidelines encompass. The third level is competence. At this level, providers implement treatment as recommended with full

support and knowledge of understanding the change and need for change in the process. The fourth level ensures proficiency. Proficiency is determined by streamlining processes of change ensuring compliance with current guidelines. The final level is expert. Providers must acknowledge and understand mistakes from previous experience, ensure complete compliance with guidelines, and demonstrate ability of autonomy.

In conclusion, Benner's model was a guide in the implementation of the Type 2 diabetes assessment algorithm. Majority of the seasoned PCPs have at some point advanced into the expert level, but they have reverted back to the novice level due to the constant modifications of guidelines. Maintaining the expert level requires training and educating. The studies showed that most patients are not being adequately managed by PCPs, and implementation of an algorithm would be beneficial in any PCP clinic.

Project Implementation/Methodology

This quality improvement project regarding the assessment of type 2 diabetic patients was adherent to Mississippi University for Women's guidelines with approval from the Mississippi University for Women Institutional Review Board obtained prior to implementation. (see Appendix B for IRB Approval). Participants were recruited by both email and personal request. To aid in improving treatment of type 2 diabetes, the methodological framework for this study is Plan-Do-Study-Act (PDSA) cycle.

Plan

The dissemination of an algorithm on the current evidence-based practice ADA guidelines for type 2 diabetes assessment was provided to each provider (see Appendix A). Also, a pretest inquiring about providers' knowledge and compliance with diabetes screening guidelines was developed and administered to each participant (see Appendix

D for Pre-test questionnaire). Following the pretest and educational session, a post test was then administered (see Appendix E for Post-test questionnaire). Google Forms was used to collect responses to each questionnaire.

Do

The providers then applied their knowledge over a 3-month period. The providers were expected to utilize the algorithm while providing care to type 2 diabetic patients. The providers were also expected to be in compliance with ADA assessment guidelines after education was provided.

Study

At the end of the project, providers' compliance was evaluated through the Post Education Self-evaluation questionnaire (See Appendix F). The providers were able to evaluate themselves and provide a measurement of where they stand with ADA assessment guidelines compliance. This allowed for evaluation of the effectiveness of this project.

Act

The project provided assessment of current practice for type 2 diabetes treatment at the clinic sites. This assessment showcased the necessity to implement an algorithm that embraces current guidelines for type 2 diabetes assessment. The PDSA module is utilized in a cyclic manner until the personnel are at the expert level, as defined by Patricia Benner's Novice to Expert theory (Ozdemir, 2019).

Tools/Instrumentation

The tools and instruments for this project include pre- and post- test, a diabetes assessment algorithm, and a Post Education Self-evaluation questionnaire .The document

entitled “Type 2 Diabetes Assessment Algorithm” in Appendix A was utilized as a major reference for the educational sessions.

The algorithm was devised to provide easily accessible type 2 diabetes assessment ADA guidelines to providers. The algorithm consisted of proper timing of eye exams, eGFR or urinary albumin, A1C, lipid profile, and monofilament tests. The pretest, post-test, and post education questionnaire utilized were developed by the researcher and therefore, only have face validity. Each questionnaire was reviewed by the project advisor prior to application for IRB approval (see Appendix D for pre-test, Appendix E for post-test, and Appendix F for post education questionnaire).

Evaluation Methods

As discussed above, evaluation methods included pre-test, post-test, and post education self-evaluation questionnaire. Data collected from nurse practitioners was first compiled in Microsoft Excel. Data was sent to a professional statistician to assist in statistical analysis. Subsequent analyses were performed using IBM SPSS Statistics Software, v. 27. Descriptive statistics were then completed by the researcher. The goal was to evaluate what knowledge the providers have before education, evaluate how well the providers comprehended the education provided, and to evaluate whether the providers actually applied the knowledge.

Project Timeline

This project was proposed during the fall semester of 2020. Research of current literature was begun, and questionnaires were developed as well. An algorithm was then created based on 2021 ADA guidelines and reviewed by the advisor. Approval from the IRB was then granted in the summer semester of 2021. Following IRB approval,

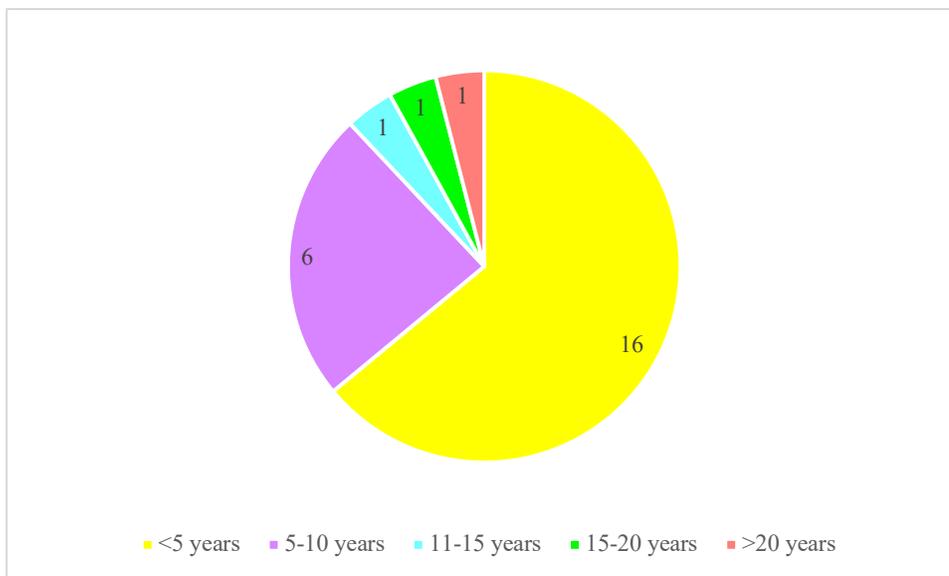
materials were then transferred into Google Forms to be distributed to potential participants. Educational sessions lasting approximately fifteen minutes took place throughout the fall semester of 2021 in which pre-test, the type 2 diabetes assessment algorithm, and post-test were administered. The self-evaluation questionnaire was collected 2-3 months following each session. At the completion of data collection, data were compiled into an Excel spreadsheet and delivered to a statistician to assist in the interpretation of findings. Results were compiled in January and February of 2022. Final defense of the project took place at the conclusion of the spring 2022 semester.

Results

This quality improvement project was conducted with the goal of increasing provider's awareness of Type 2 diabetes assessment guidelines according to the ADA. Educational sessions were conducted in which a pre-test was administered beforehand, post-test administered immediately following the session, and self-evaluation was administered two to three months later. Descriptive and inferential statistics were utilized in the analysis of responses provided from questionnaires.

Participants

Three surveys were given: pre-test, post-test, and three-month follow-up. A total of 25 nurse practitioners completed the pre-test, 19 completed the post-test, and 12 completed the three-month follow-up surveys. The experience of respondents was self-reported on the pre-test and post-test. Of the 25 participants who completed the pre-test, most had less than five years of experience (see Figure 1). Each participant had experience in primary care and had treated type 2 diabetic patients.

Figure 1.*Nurse Practitioner Experience*

Note: This chart shows the years of nursing experience for pre-test survey respondents.

Outcomes

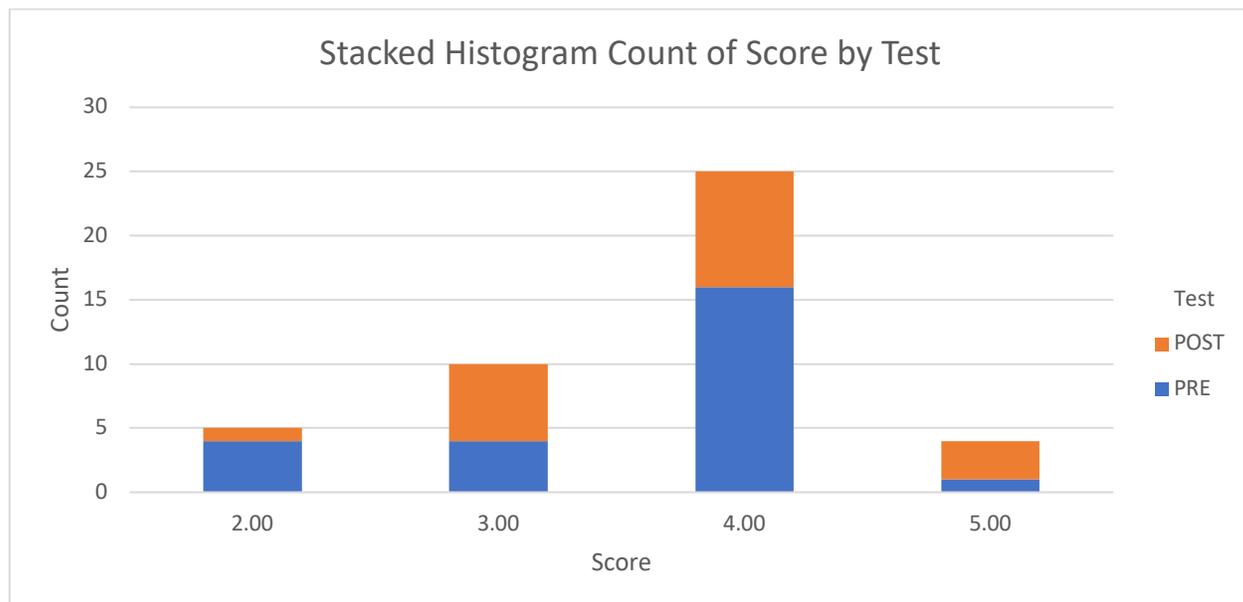
Providers often struggle to grasp the ever-growing field of medical knowledge. Providers must maintain a sense of curiosity in order to avoid becoming complacent with outdated diagnostic and treatment algorithms. According to the results, providers were unaware of proper timing of the assessments of type 2 diabetes. This was possibly due to not integrating revised guidelines into their practice. It can be difficult to keep up with the various guidelines. This is why providers may benefit from easily accessible tools such as algorithms. One professor stated, “Even when a guideline is clear and relevant, other doctors say inadequate dissemination and implementation can still derail quality improvement efforts” (Nelson, 2016). The results of this project were not significant as explained below.

Pre-test versus Post-test

The pre-test and post-test surveys were scored based on correct answers provided by the student researcher. Each survey had a total possible score of five points. The distribution of scores from the returned surveys is shown in Figure 2. The scores on the pre-test ranged from 2 to 5, with an average score of 3.56 and a standard deviation of 0.82. The scores on the post-test ranged from 2 to 5, with an average score of 3.74 and a standard deviation of 0.81. Figure 2 utilizes a histogram to show results of the total number of participants correctly answering the pre-test versus post-test. For instance, there were a total of 25 participants scoring a 4 out of 5 on the pre-test and post-test. 16 of these participants, shown in blue, scored a 4 on the pre-test, and 9 of those participants, shown in orange, scored 4 out of 5.

Figure 2.

Pre-test versus Post-test



Note. Score distribution of pre-test and post-test surveys, where a maximum score is five points.

A one-way analysis of variance (ANOVA) was conducted to determine if there was a significant difference in scores between the pre-test and post-test surveys.

ANOVA results showed no statistical difference between the scores of the two surveys ($F(1, 42) = .509, p = .479$). While the average score improved by 0.18 points, the difference is not statistically significant and may have been due to chance.

Every participant answered the question correctly regarding the assessments that should be routinely done when managing type 2 diabetes, which include A1C tests, eye exams, lipid panels, monofilament tests, and urinary albumin shown in Appendix D and Appendix E. Another question asked, “In patients with stable glycemic control, how often should A1C testing be done?”. 83.3% of participants answered this question incorrectly on the pretest.

A1C testing should be done once a year when glycemic control is stable. In participants experienced 5-10 years, only one participant answered the question correctly on the pre-test. 100% of participants with more than 10 years of experience answered the question incorrectly on the pre-test and post-test. On both the pre-test and post-test, 100% of participants answered the question correctly regarding A1C testing in patients with unstable glycemic control or whose therapy has changed. The correct answer is every 3 months. 75% of participants answered correctly on the pre-test stating that eye exams should be completed every 1-2 years in glycemic controlled type 2 diabetic patients if there is no evidence of retinopathy. 25% of participants answered every 6 months in response to the question. Three out of nine participants who have 5 or more years of experience answered the question incorrectly. The final question asked was “How often should monofilament testing be done on type 2 diabetic patients?”. The answers varied

significantly with this particular question. 66.7% of participants answered correctly on the pre-test that monofilament testing should be completed every year. On the post-test, 63.2% of participants answered the question correctly. This decrease could possibly be due to less participants.

Impact of Experience

Given the distribution of experience levels within the participants, the experience was binned into two groups: those with less than five years of NP experience and those with more than five years of NP experience. Results are summarized in Table 1.

Table 1.

Pre-test & Post-test Results

	<i>Sample Size</i>	<i>Mean</i>	<i>Std Dev</i>
Pre-Test			
All participants	25	3.56	0.82
<5 years' experience	16	3.81	0.66
>5 years' experience	9	3.11	0.93
Post-Test			
All participants	19	3.74	0.81
<5 years' experience	15	3.80	0.77
>5 years' experience	4	3.50	1.00

Note. This is a summary of survey results for pre-test and post-test.

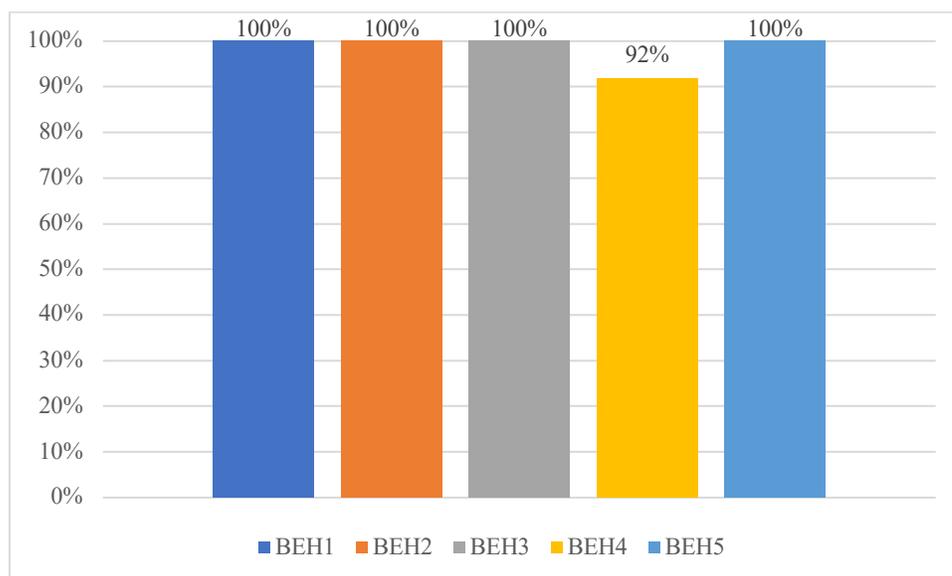
A general linear model was constructed to determine the effects of both test type (pre-test or post-test) and experience (less or more than five years) on test scores. The model showed that the effect of test type ($F(1, 40) = .467, p = .498$), experience ($F(1, 40) = 3.309, p = .076$), and the test experience interaction ($F(1, 40) = 0.532, p = .470$) were all not statistically significant. The difference in scores was not statistically different based on test type or experience. This was surprising due to the expectation that education provided would increase the knowledge of providers.

Three-month Follow-up

Participants were invited to complete a self-evaluation three months after the educational session. Only twelve out of twenty-five of beginning participants completed the self-evaluation questionnaire. Results of the self-evaluation are shown in Figure 3. BEH1 represents performing A1C testing, . BEH2 represents performing lipid panels, BEH3 represents recommending eye exams, BEH4 represents performing monofilament testing, and BEH5 represents performing eGFR or urinary albumin testing. The data shown in the figure is the percentage of respondents indicating yes to the behavior listed on that survey item. 92% of respondents admitted to performing yearly monofilament testing. All five survey items had a majority of respondents indicating that they were performing the recommended behavior.

Figure 3.

Post Education Self-Evaluation Questionnaire



Note. This chart illustrates the participants' three-month self-evaluation results.

Project Limitations

Several limitations were noted with the implementation of the project. One of the limitations of this study evaluation is that the use of the algorithm by participants was not assessed in the follow-up questionnaire. Also, the algorithm included assessment criteria for monofilament tests, eye exams, A1C tests, lipid panels, and eGFR and/or urinary albumin. The researcher educated providers on each of these criteria but did not include the evaluation of knowledge regarding eGFR and/or urinary albumin in the pre- and post-test. There was a lack of questions to determine whether the algorithm was followed such as monofilament testing, eye exams, and A1C testing of stable diabetic patients. Webb, Rheeder, & Wolvaardt (2019) conducted an audit of guidelines and found that providers did not perform monofilament testing due to lack of correct equipment and supplies. Another limitation was the small sample size of this study. Also, the three questionnaires utilized in the study were developed by the researcher and only had face validity. Lastly, the number of respondents decreased following the pre-test. The engagement of the participants was not maintained possibly due to time limitations.

Implications and Recommendations

There was not a large sample size, and the results of this project were not statistically significant. However, the three-month follow up did show an improvement. There are implications and recommendations that are drawn from this quality improvement project. Additional elaboration regarding implications for nursing, nursing education, and the community will be discussed.

Nursing

This research revealed that exposure to the algorithm led to compliance with guidelines in assessment of type 2 diabetes. It is recommended that all PCPs continue to follow these guidelines and utilize this algorithm or other helpful materials to aid in compliance with ADA recommendations.

Nursing Education

The results of this study indicated that distribution of easily accessible guidelines through educational sessions aided by an algorithm led to performance of the recommended behavior. The researcher recommends that the algorithm be implemented as a tool used in all nurse practitioner programs. Future research on this topic could possibly provide evidence to support this (Rushforth et al., 2016). This algorithm could not only be distributed to nurse practitioners but to medical doctors as well. The findings could also be disseminated through nursing publications and continuing education events.

Community

PCPs who make a change to their clinical practice as a result of being introduced to the provided material have the potential to impact the health of their entire community. Type 2 diabetes can lead to chronic complications and even death if not properly managed. By assessing type 2 diabetic patients appropriately, comorbidities can be prevented, and community health could improve overall (Erwin, Pitlick, & Peters, 2015).

Budget/Cost

This project was inexpensive but required time away from work. The researcher was reimbursed for time spent on the project due to conduction for academic purposes. The gross estimates for travel and material for participants are calculated below.

Expense	Estimated Cost
Travel to present project to participants	\$200
Printing materials and algorithm for distribution when presenting	\$100
Total	\$300

Conclusion

In conclusion, this quality improvement project was completed to determine if implementation of a type 2 diabetes algorithm would improve healthcare providers assessment of type 2 diabetic patients. Based on ADA guidelines, an algorithm designed by the researcher was used as an instrument to educate providers. A total of three questionnaires were administered to primary care providers. Following statistical analysis, it was determined that the project goals were met. 92% of providers reported complete assessment of type 2 diabetic patients. Therefore, it was concluded that this algorithm should be distributed to as many primary care providers as possible to potentially improve the quality of care provided to all diabetic patients.

References

- American Academy of Family Physicians. (2021). *Primary Care*.
<https://www.aafp.org/about/policies/all/primary-care.html>
- American Diabetes Association (2021). Introduction: Standards of medical care in diabetes- 2021. *Diabetes care : the journal of clinical and applied research and education*, 44(1), S1-S232. <https://doi.org/10.2337/dc21-SINT>
- Erwin, P., Pitlick, M., & Peters, G. (2015). Maintenance of Goal blood pressure, cholesterol, and A1C levels in veterans with type 2 diabetes after discharge from a pharmacist-managed ambulatory care clinic. *American Diabetes Association*, 28(4), 237-244. <https://doi.org/10.2337/diaspect.28.4.237>
- Garber, A., Abrahamson, M., Barzilay, J., Blonde, L., Bloomgarden, Z., Bush, M., Dagono-Jack, S., DeFronzo, R., Einhorn, D., Fonseca, V., Garber, J., Garvey, T., Grunberger, G., Handelsman, Y., Hirsch, I., Jellinger, P., McGill, J., Mechanick, J., Rosenblit, P., & Umpierrez, G. (2019). American Association of Clinical Endocrinologists and American College of Endocrinology on the comprehensive type 2 diabetes management algorithm-2019 executive summary. *Endocrine Practice*, 25(1), 69-100. <https://doi.org/10.4158/CS-2018-0535>
- Kosiborod, M., Gomes, M.B., Nicolucci, A., Pucocck, S., Rathmann, W., Shestakova, M., Watada, H., Shimomura, I., Cen, H., Ruzafa, J., Fenici, P., Hammar, N., Surmont, F., Tang, F., & Khunti, K. (2018). Vascular complications in patients with type 2 diabetes: Prevalence and associated factors in 38 countries (the DISCOVER study program). *Cardiovasc Diabetol*, 17(1), 150. <https://doi.org/10.1186/s12933-018-0787-8>

- Mayo Clinic Staff. (2021). *Type 2 diabetes: Diagnosis and treatment*. Retrieved from <https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/diagnosis-treatment/drc-20351199#:~:text=Type%20%20diabetes%20is%20usually,past%20two%20to%20three%20months>
- Merriam-Webster. (n.d.). Knowledge. In Merriam-Webster.com dictionary. Retrieved [November 18, 2021], from <https://www.merriam-webster.com/dictionary/knowledge>
- Murchison, A., Hark, L., Pizzi, L., Dai, Y., Mayro, E., Storey, P., Leiby, B., & Haller, J. (2017). Non-adherence to eye care in people with diabetes. *BMJ Open Diabetes Research and Care*, 5(e000333), 1-10. <https://doi.org/10.1136/bmjdr-2016-000333>
- Nelson, B. (2016). Why aren't doctors following guidelines? *The Hospitalist*. <https://www.the-hospitalist.org/hospitalist/article/121436/why-arent-doctors-following-guidelines>
- Ozdemir, N. (2019). The development of nurses' individualized care perceptions and practices: Benner's novice to expert model perspective. *International Journal of Caring Sciences*, 12(2), 1279-1285.
- PowerDMS. (2020). Definition of compliance in healthcare. <https://www.powerdms.com/policy-learning-center/definition-of-compliance-in-healthcare>

- Rawshani et al. (2017). Mortality and cardiovascular disease in type 1 and type 2 diabetes. *The New England Journal of Medicine*, 376(15).
<https://www.nejm.org/doi/pdf/10.1056/NEJMoa1608664>
- Rushforth, B., McCrorie, C., Glidewell, L., Midgley, E., & Foy, R. (2016). Barriers to effective management of type 2 diabetes in primary care: Qualitative systematic review. *British Journal of General Practice*, 66(643), e114-e127.
<https://doi.org/10.3399/bjgp16X683509>
- Saraiva Lucoveis, M. do L., Antar Gamba, M., Boccara de Paula, M. A., & da Silva Morita, A. B. P. (2018). Degree of risk for foot ulcer due to diabetes: Nursing assessment. *Revista Brasileira de Enfermagem*, 71(6), 3041–3047. <https://doi-org.libprxy.muw.edu/10.1590/0034-7167-2017-0189>
- Shatnawi, N. J., Al-Zoubi, N. A., Hawamdeh, H. M., Khader, Y. S., Garaibeh, K., & Heis, H. A. (2018). Predictors of major lower limb amputation in type 2 diabetic patients referred for hospital care with diabetic foot syndrome. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 11, 313–319.
<https://doi.org/10.2147/DMSO.S165967>
- Shawley-Brzoska, S. & Misra, R. (2018). Perceived benefits and barriers of a community-based diabetes prevention and management program. *Journal of Clinical Medicine*, 7(3), 58. doi:10.3390/jcm7030058
- The Centre for Effective Services. (2021). CES guide to implementation.
<https://implementation.effectiveservices.org/overview/what-is-implementation>
- Webb, E. M., Rheeder, P., & Wolvaardt, J. E. (2019). The ability of primary healthcare clinics to provide quality diabetes care: An audit. *African Journal of Primary*

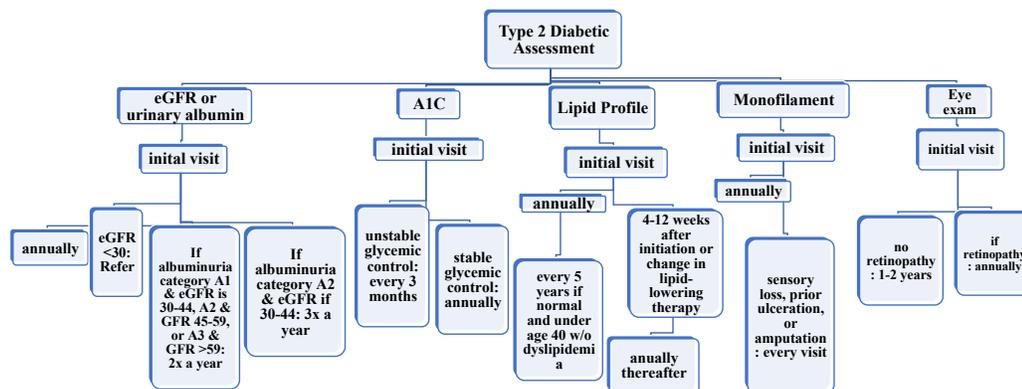
Health Care & Family Medicine, 11(1), e1–e6.

<https://doi.org/10.4102/phcfm.v11i1.2094>

Wexler, D. (2021). Patient education: Preventing complications from diabetes (beyond the basics). *UpToDate*. Retrieved [November 18, 2021], from <https://www.uptodate.com/contents/preventing-complications-from-diabetes-beyond-the-basics>

Appendix A

Type 2 Diabetes Assessment Algorithm



*Refer patients who smoke or have histories of prior lower-extremity complications, loss of protective sensation, structural abnormalities, or peripheral arterial disease to foot care specialists for ongoing preventive care and lifelong surveillance.

*Refer to nephrologist if patient has an active urinary sediment, rapidly increasing albuminuria or nephrotic syndrome, or rapidly decreasing eGFR.

*A1: <30 mg/g urinary albumin/creatinine ratio (normal to mildly increased)

*A2: 30-300 mg/g urinary albumin/creatinine ratio (moderately increased)

*A3: >300mg/g urinary albumin/creatinine ratio (severely increased)

Appendix B
IRB Approval

To: Jasmine Granger and Dr. Sally Pearson

From: Irene Pintado, IRB Chair *I.P.*

Date: 6/1/2021

Project: Improving Primary Care Providers' Assessment of Type 2 Diabetic Patients

The Mississippi University for Women IRB committee has determined that your project is exempt under 45 CFR 46.101 (b)(4). If any changes are made to the study, the Committee must be notified. If the project is still running twelve months after the date of this memo, please be advised that we will need an update for our files.

Good luck with your work!

Appendix C

Search Strategy

		Synonyms				
Main Ideas / Concepts	Type 2 Diabetes	<i>Insulin resistance</i>	<i>hyperglycemia</i>	<i>Excess glucose</i>	<i>Blood sugar</i>	<i>Diabetes Mellitus</i>
	Implementation	<i>Application</i>	<i>Enforcement</i>	<i>Enactment</i>	<i>Utilization</i>	<i>Development</i>
	Guidelines	<i>Recommendations</i>	<i>Centers for Disease Control and Prevention</i>	<i>American Diabetes Association</i>	<i>Algorithm</i>	<i>Provider guide</i>
	Assessment	<i>Diagnosing</i>	<i>Evaluation</i>	<i>Analysis</i>	<i>Examination</i>	<i>Diagnostic testing</i>
	Primary Care	<i>Family Practice</i>	<i>Family Medical Doctor</i>	<i>Family Nurse Practitioner</i>	<i>Internal Medicine</i>	<i>Chronic Care</i>

Broad Terminology →	Addition of Synonyms →	Addition of Search Limitations Discussed in Text
>863,000 Results	19, 200 Results	1,430 Results

*Appendix D***Type 2 Diabetes Assessment**

Dear Participant,

This questionnaire is to evaluate your knowledge of assessing patients with type 2 diabetes. Responses to this questionnaire will be utilized to determine the effectiveness of a practice improvement project for completion of my doctor of nursing practice (DNP) degree. Participation is strictly voluntary. Completion and submission of this questionnaire implies consent to participate in the study. You may choose to withdraw from the study at any time prior to submission. All submissions will be anonymous; therefore, I ask that you do not enter your name or personal identifiers on the survey. Thank you for your participation.

Sincerely,

Jasmine Granger, MSN, FNP-BC

Pre-test

1. Years of NP experience
 - <5 years
 - 5-10 years
 - 11-15 years
 - 15-20 years
 - >20 years
2. What tests or assessments should be routinely done when managing type 2 diabetes?
 - Lipid panel
 - A1C
 - Monofilament
 - Eye exam
 - eGFR and urinary albumin
 - All of the Above
3. In patients with stable glycemic control, how often should A1C testing be done?
 - Once a year
 - Twice a year
 - Every 3 months
4. In patients with unstable glycemic control or their therapy has changed, how often should A1C testing be completed?
 - Every 3 months
 - Once a year
 - Twice a year
5. How often should eye exams be completed in glycemic controlled type 2 diabetic patients if there is no evidence of retinopathy?
 - 1-2 years
 - Every 6 months
 - Every 3 years
6. How often should monofilament testing be done on type 2 diabetic patients?
 - Every 6 months

- Every year
- Every 3 months
- Every 2 years

*Appendix E***Type 2 Diabetes Assessment****Post-test**

1. Years of NP experience
 - <5 years
 - 5-10 years
 - 11-15 years
 - 15-20 years
 - >20 years
2. What tests or assessments should be routinely done when managing type 2 diabetes?
 - Lipid panel
 - A1C
 - Monofilament
 - Eye exam
 - eGFR and urinary albumin
 - All of the Above
3. In patients with stable glycemic control, how often should A1C testing be done?
 - Once a year
 - Twice a year
 - Every 3 months
4. In patients with unstable glycemic control or their therapy has changed, how often should A1C testing be completed?
 - Every 3 months
 - Once a year
 - Twice a year
5. How often should eye exams be completed in glycemic controlled type 2 diabetic patients if there is no evidence of retinopathy?
 - 1-2 years
 - Every 6 months
 - Every 3 years
6. How often should monofilament testing be done on type 2 diabetic patients?
 - Every 6 months
 - Every year
 - Every 3 months
 - Every 2 years

Appendix F

Post Education Self-Evaluation Questionnaire

Dear Participant,

This questionnaire is to evaluate whether you applied your knowledge of assessing patients with type 2 diabetes after the educational session that you participated in 3 months ago. Responses to this questionnaire will be utilized to determine the effectiveness of a practice improvement project for completion of my doctor of nursing practice (DNP) degree. Participation is strictly voluntary. Completion and submission of this questionnaire implies consent to participate in the study. You may choose to withdraw from the study at any time prior to submission. All submissions will be anonymous; therefore, I ask that you do not enter your name or personal identifiers on the survey. Thank you for your participation.

Sincerely,

Jasmine Granger, MSN, FNP-BC

Post Education Self-evaluation

1. I performed A1C testing within 3 months on all type 2 diabetic patients with unstable glycemic control.
 Yes
 No
2. After initial diagnosis, I performed a fasting lipid profile annually on type 2 diabetic patients who have not had testing in at least 5 years.
 Yes
 No
3. I recommended my diabetic patients have an annual eye exam?
 Yes
 No
4. I performed monofilament testing on my type 2 diabetic patients that have not had testing in at least a year.
 Yes
 No
5. I monitored my patients' kidney function (eGFR or urinary albumin) that have not had testing in at least a year or referred patients to nephrologist if not stable.
 Yes
 No