2023

Improving Self-Efficacy of Primary Care Providers With Assessment of Diabetic Peripheral Neuropathy

Kimberly Paddock Farr
Walden University

Walden University

College of Nursing

This is to certify that the doctoral study by

Kimberly Farr

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Mark Wells, Committee Chairperson, Nursing Faculty
Dr. Joan Hahn, Committee Member, Nursing Faculty
Dr. Janine Everett, University Reviewer, Nursing Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D

Walden University

2023

Abstract

Improving Self-Efficacy of Primary Care Providers With Assessment of Diabetic Peripheral Neuropathy

by

Kimberly Farr

MS, Walden University, 2014

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

February 2023

Abstract

Diabetic peripheral neuropathy (DPN) is one of the most common complications of diabetes. DPN contributes to significant pain, debility and injury to diabetic patients. The majority of diabetic patients are managed in the primary care practice (PCP) setting. A local chapter of a nurse practitioner association identified a lack of knowledge of current evidence-based guidelines for effective screening and assessment of DPN in the PCP environment. The practice-focused question for this project was to determine if an educational intervention on evidence-based screening and assessment would improve nurse practitioner's knowledge with DPN screening and diagnosis in PCP. Mezirow's transformative theory of adult learning, Bandura's self-efficacy theory, and the ADDIE model were used as the theoretical foundations for this project. Eleven nurse practitioners participated in an asynchronous web-based educational presentation on screening and assessment diagnostic guidelines and tools for DPN for the PCP patients. A pre- and posttest design was used to evaluate whether the intervention was effective. Paired-samples *t*-test results showed a statistically significant increase ($p < .001$) in the nurse practitioners' knowledge for DPN screening and assessment for the PCP setting. Nurse practitioners demonstrated improved knowledge in the diabetic foot screening and assessment for DPN. The project may impact nurse practitioner practice through improvement of nurse practitioners' knowledge of DPN risks, screening, and diagnostic guidelines for PCP diabetic patients and bring about a positive social change by reducing the risk of DPN complications.

Improving Self-Efficacy of Primary Care Providers With Assessment of Diabetic Peripheral Neuropathy

by

Kimberly Farr

MS, Walden University, 2014

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

February 2023

Table of Contents

List of Tables

Section 1: Nature of the Project

Introduction

The Centers for Disease Control and Prevention (CDC) estimates that over 37 million Americans have been diagnosed with diabetes in 2020 (CDC, 2020). The American Diabetes Association (ADA) reports that diabetic peripheral neuropathy (DPN) is present in newly diagnosed Type 2 diabetes in approximately 10%–15% of patients (Pop-Busui et al. 2017). Incidence rises to 50%–90% after 10 or more years of disease progression (Callaghan et al. 2012). The healthcare risks and complications with DPN are injuries to the feet, amputations due to chronic wounds, and injuries from falls (Hicks & Selvin, 2019). The burden of diabetes is expected to increase to 39.7 million (13.9%) Americans in 2030 and to 60.6 million (17.9%) in 2060, an increase of approximately one million per year (Lin et al. 2018) There will be a correlated increase in DPN burden.

DPN is responsible for almost 33% of diabetic costs in the United States, which amounts to almost $250 billion per year (Wukich et al. 2006). Diabetic foot ulcer is one of the most common complications of diabetes. The annual cost of foot ulcer care in the United States is $5 billion. Over 15% of patients with diabetes develop ulcers of the lower extremity and 7%–20% of foot ulcer patients will require amputation (Wukich et al. 2006). The effects of DPN impacts the patient in quality of life from physical function, social function, emotional and mental health (Adams et al. 2017; Gore, 2005). Adams et al. (2017) reported, “there is growing evidence that DPN is underdiagnosed and undertreated in primary care settings.” Approximately 90% of diabetic patients are treated in the primary care setting in the United States (Furno, 2014). Primary care

providers will need to find evidence-based methods for early screening of DPN to avoid significant consequences to their diabetic patient population.

In this project, I explored whether a staff education event would improve the knowledge with DPN assessment and screening measures with use of nationally recognized evidence-based practices among nurse practitioners of a local nurse practitioner association. DPN presents a diagnostic complexity as there is not a single test that can be done for a definitive diagnosis (Carmichael et al. 2021). The additional challenges with DPN assessment are patients' hesitancy to talk about pain symptoms, lack of health knowledge, and the time constraints of primary care providers. Screening and assessment will require the coordination and a collaborative approach of the team members in the primary care setting (Furno, 2014).

Walden University's social change mission project was supported by the outcome of this staff education project because I educated and empowered nurse practitioners with knowledge and competency for best practices with DPN assessment. As Furno (2014) estimated, 90% of diabetic patients are treated in primary care settings; this will have a direct impact on patient quality of health and a decrease on the financial burden to the healthcare system. The newly acquired knowledge and skills presented in this education update are projected to reduce DPN complications through adoption of updated screening practices by the participating nurse practitioners. Early identification of DPN will lead to earlier interventions for further assessments and referrals (Yang et al. 2019).

Problem Statement

The clinical practice problem relates to the lack of knowledge by nurse practitioners to conduct assessment of DPN using the latest best practice guidelines. Nurse practitioners in the primary care setting are responsible for the prevention, screening and management of patients for diabetes and diabetic neuropathy (Adams et al. 2017). In the neuropathy clinic, patients present as self-referred for persistent symptoms of pain and numbness. This patient population has demonstrated a lack of health knowledge of causes of neuropathy, correlation to diabetes or other causes, or to assessment/diagnostic evaluation. The review of medical records of patients I treat demonstrated a lack of assessment in the primary care settings.

Primary care practices (PCPs) are challenged to keep up with the various recommended screenings for several chronic conditions (Porter et al. 2022). The ADA has recommended several regular screenings of the diabetic patient including for DPN. The most common testing with vibration (by tuning fork) and sensation (with monofilament) diagnoses DPN after irreversible damage has occurred (Carmichael et al. 2021). There are interview-based assessment tools that are effective and efficient to use in clinical practice which allow for earlier detection of neuropathy to use used with the physical assessment tools (Carmichael et al. 2021). However, nurse practitioner leaders in a local nurse practitioners association informed me that the general membership has voiced a lack of efficient use of guideline recommendations when presented with educational updates.

The nurse practitioner leadership identified a need for evidence-based education for nurse practitioners specifically related to diabetic complications. The primary clinical practice concern I addressed was the process and strategies utilized for assessment of DPN. My focus was on educational support for providers with a long-term goal of improving patient quality outcomes for patients with DPN. The focus of the education was on nurse practitioners' knowledge of DPN assessment. The goal of an educational intervention was to present information to increase knowledge, confidence and competence with assessment of DPN.

Purpose Statement

The purpose of this project was to educate nurse practitioners on how to use the interview assessment questions and physical diagnostic tools for DPN evaluation. The participants needed to understand the application of the DPN evaluation for their own interpretation and to provide education to their patients. The gap in practice I identified was the lack of knowledge for the assessment processes and diagnostic tools for DPN. The American Association of Nurse Practitioners (AANP, 2022) has estimated that more than 355,000 licensed nurse practitioners currently practice in the United States, with 88.9% certified in primary care and 70.2% working in primary care settings. Membership in local nurse practitioner organizations are often the source of continuing education and ongoing collaborative support for nurse practitioners (Matthews,2012).

The practice-focused question I addressed was: Will an educational intervention on diabetic neuropathy assessment and diagnostic guidelines improve nurse practitioners' knowledge with diabetic neuropathy as measured by a pretest and posttest comparison?

The ADA has issued a statement for the management of DPN that refers to best practices for assessment of DPN at the primary care level (Pop-Busui et al. 2017). The complications and chronic pain of DPN is a significant health problem for an estimated 15 million people in the United States (Adams et al. 2017). Educating nurse practitioners with updates on assessment and diagnostic guidelines will improve patient outcomes with DPN (Keneflick et al. 2008; Seal et al. 2017). The goal was to increase the knowledge to aid with early detection of DPN before irreversible damage and subsequent consequence.

Nature of the Doctoral Project

Selected guidelines were reviewed for evidence of best practices that will include assessment and recommended diagnostic guidelines in the primary care setting. I reviewed CINAHL, EBSCO, Medline, the CDC, the ADA, and the Agency for Healthcare Research and Quality (AHRQ) for peer-reviewed articles on research and best practices and guidelines for assessment of DPN. Another source of evidence gathered during development and implementation of the staff education project was guidelines from podiatry associations and recommended DPN assessment guidelines. The advanced nursing practice association assisted with coordination of delivery of the educational project. The practice association and I collaborated and confirmed the final educational content of the educational seminar.

With this project, I presented the educational intervention to the nurse practitioners to specifically focus on the best practice assessment guidelines and recommended diagnostic strategies employed in the primary care environment. Emphasis

was given to diagnostic assessment and improvement of healthcare outcomes of DPN. Evidence generated during the project followed approval from the Walden University Institutional Review Board (IRB; Approval No. 10-31-22-0353058) and was drawn from the data collected. Content experts reviewed the pre/posttest, evaluated the assessment and diagnostic strategy guidelines and evaluated the content of the staff education presentation prior to implementation.

Significance

Stakeholders for this project included nurse practitioners with a membership in a regional nurse practitioner association (includes retired, active, and students) including the leadership and general membership of the local chapter and neighboring chapter memberships. I planned my efforts with the nurse practitioner association to improve methods for DPN assessment and diagnostic strategies with the focus on patient quality outcomes. The project specifically addressed knowledge, confidence and competency with assessment of DPN. The local chapter leaders (a large county in metropolitan area in a southern state) of a regional advanced practice registered nurses' association assisted with arranging the educational seminar. Although the PCP is the main focus setting for education, motivation and engagement for the diabetic patient population (Bartol, 2012), nurse practitioners in the nurse practitioner association represented a wide variety of practice settings. The nurse practitioner organization afforded the broadest audience to update nurse practitioners across all practice settings.

The completion of this project made a positive contribution to nurse practitioners' practice with DPN assessment. It is anticipated that complications will be reduced, and

outcomes improved by equipping and empowering nurse practitioners through the education intervention. The resultant increase in assessment and diagnostic competency could decrease the incidence of undiagnosed and untreated DPN in their diabetic patient population (Chan et al. 2020). By increasing nurse practitioners' knowledge with DPN, assessment strategies would be used in other diabetic assessments that will add to positive health outcomes for other chronic diabetic conditions.

Summary

DPN is a significant consequence for the diabetic population (Adams et al. 2017; Stino & Smith, 2017). This project addressed the importance of conducting routine screening for patients with diabetes in the primary care setting. DPN assessment and diagnosis can be efficient and effective in the primary care setting when updated evidence-based clinical practice guidelines are used (Sobhy, 2016). There was a need for educational update on current evidence-based guidelines on DPN assessment requested by the leaders and membership of the nurse practitioner association. The purpose of the approach that was reviewed in this section is elaborated upon in Section 2.

Section 2: Background and Context

Introduction

The project addressed the importance of routine screening of DPN for diabetic patients in the primary care setting. The practice-focused question addressed in this project was whether an educational intervention on diabetic neuropathy assessment and diagnostic guidelines would improve nurse practitioners' knowledge with diabetic neuropathy as measured by a pretest and posttest comparison. The purpose for this project was to equip nurse practitioners to use the assessment guidelines to employ interventions for preventive measures and mitigate complications of DPN sequelae.

Section 2 of this paper reviews the concepts, models, and theories used to guide the development of the project; explains the relevance to nursing practice; and provides local background and context for the project development.

Concepts, Models, and Theories

For this Doctor of Nursing Practice (DNP) educational project, I chose Mezirow's transformative theory of adult learning, which holds that adult learning, unlike child learning, is influenced when an adult student's past ideas and references are challenged when presented with new information. According to Mezirow (1997), the phases of transformative learning are as follows:

- A disoriented dilemma: This is described as a condition where a learner comes into information that contradicts what they have believed. It can either be a new understanding or a new challenge. It is the start of the transforming process.

- Self-examination: This self-review of past beliefs and experiences is the step where students create the perspective shift: that theirs is not the only perspective.
- Critical assessment of assumptions: Students take a deeper look into their past beliefs and review them. There may be acceptance that some of these beliefs could be wrong. This step further builds on perspective transformation as it helps the student reduce bias from their past.
- Planning a course of action: Students are now able to think through what they need to understand the topic from this newly acquired perspective.
- Acquisition of knowledge or skills to carry out new plan: This phase is where the real learning begins to occur as the student now puts the plan to learn into action.
- Exploring and trying new roles: Learning continues as it is put into practice and experienced firsthand.
- Building self-efficacy in new roles and relationships: Self-efficacy in transformative learning is about building confidence in the newly acquired beliefs and decisions.

Transformative learning theory is key to the assessment of DPN as it challenges the nurse practitioners to rethink the way they have been performing these assessments and challenges their abilities to implement the steps in guidelines that will improve outcomes.

I also chose Bandura's theory of self-efficacy as a framework for this project. Bandura's theory combines well with transformative theory because it builds on the concept of belief. Bandura (1994) defined self-efficacy as "people's belief about their capabilities to produce designated levels of performance that exercise influence over events that affects their lives. In a qualitative study, Zamani-Alavijah et al. (2019) concluded that healthcare providers' emotional states due to their self-efficacy beliefs can affect judgment and performance. Also significant in the Zamani-Alavijah et al.'s study was the finding that self-efficacy was increased through increased professional knowledge and skill.

I used the ADDIE model as the guide for educational project development. The ADDIE model is a systematic method as described by the following steps (Kurt, 2017):

- Analyze: I determined the gap in care with the assessment of diabetic neuropathy through personal review of patient charts in my own practice treating diabetic neuropathy, interviews with primary care providers and with the leadership team of the local chapter of a nurse practitioner association. The leadership team communicated the needs of their membership regarding lack of knowledge with evidence-based guideline for DPN assessment and requested an educational update.
- Design: I have collaborated with the stakeholders with the nurse practitioner's association to design an educational seminar to meet the length and format requirement.

- Develop: I developed a literature matrix along with a PowerPoint and pre/posttest for the stakeholders and content experts to review prior to finalizing.
- Implement: After IRB approval, I delivered the staff education in-service per the program approval.
- Evaluate: Evaluation was conducted via pre/posttest analysis and per summative evaluation with stakeholder input.

The ADDIE model is a systematic method to determine the needs of the project site. The nurse practitioner leadership team communicated the needs of the membership regarding lack of knowledge on evidence-based guideline for DPN assessment. I collaborated with the stakeholders with the nurse practitioner association to design the education seminar to meet the length and format requirement. The literature matrix along with the PowerPoint and pre/posttest that I developed was reviewed by the stakeholders and content experts prior to its finalization. Once IRB approval was received, the staff education in-service was completed per the program approval. Evaluation was conducted via pre/posttest analysis and per summative evaluation with stakeholder input.

Definitions

The terms used in this project are defined as follows:

Diabetic peripheral neuropathy – "the presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after the exclusion of all other causes" (Pop-Busui et al. 2017).

Neuropathic pain – "pain resulting from lesion or dysfunction of the nervous system" (Argoff et al. 2006).

Chronic care model – "organizing framework for improving chronic illness care and an excellent tool for improving care at both the individual and population level. The model is based on the assumption that improvement in care requires an approach that incorporates patient, provider, and system level interventions" (Flandt, 2006).

Semmes Weinstein monofilament – a clinical test for sensory assessment of the feet using a 10g strand of nylon (Semmes-Weinstein monofilament, n.d.).

Primary care practice – "the provision of *integrated, accessible health care services* by clinicians who are *accountable* for addressing a large *majority of personal health care needs*, developing a *sustained partnership* with *patients*, and practicing in the *context of family and community*" (Institute of Medicine, 1996).

Relevance to Nursing Practice

I reviewed the ADA Guidelines and respective updates for guidance on research for this DNP project. I also used the following websites and databases: the AHRQ, the CDC, Medline, CINAHL, and EBSCO. I searched for diabetes, peripheral neuropathy, primary care, assessment and guidelines. I selected peer-reviewed articles, preferably within 5 years. The literature relevant to this project is reviewed next.

DPN Clinical Presentation and Differential Diagnosis

Argoff (2006) stated "to understand the prevalence of DPN, it helps to understand the various forms it takes." The most common type of DPN (chronic sensorimotor distal symmetrical polyneuropathy) typically presents with pain that may be described as

burning, electric sensations, or tingling with or without numbness (Argoff, 2006). The exact pathophysiology of DPN is poorly understood and there is no current treatment to arrest or cure its progression (Argoff, 2006; Bodman & Varacallo, 2022). The diagnosis of DPN is confirmed after the exclusion of all other possible causes (Pop-Busui, et al. 2017). Peripheral neuropathies can be symptomatic of (a) metabolic diseases such as thyroid disease, (b) systemic disease such as amyloidosis, (c) infectious disease such as Lyme disease, (d) nutritional deficiencies such as thiamine, and (e) drug related such as alcohol or chemotherapy (Pop-Busui, et al. 2017). The ADA recommends a comprehensive evaluation to include symptom history, family history, medication history and laboratory testing (Pop-Busui, et al. 2017). Timely interventions, which include prevention efforts and accurate diagnoses, will improve patient outcomes (Bodman & Vacarrao, 2022).

DPN Assessment Strategies and Guidelines

The ADA also recommends strategies for assessing DPN that include specific pain surveys and physical testing (Pop-Busui, et al. 2017). DPN screening should be done when diabetes is first diagnosed and then yearly afterwards (Pop-Busui, et al. 2017). Once a diagnosis of DPN has been established, assessment of DPN should be done every 3 months (ADA, 2019). Bouhassira et al. (2005) developed a 10-question neuropathic pain tool (DN4) that has two short sections to be completed by the patient and two short sections to be completed by the examiner. The questions are directly related to neuropathic pain symptoms of burning, painful cold, electric shocks, tingling, pin/needles, numbness and itching as a review of symptoms by the patient and an exam

by the provider to determine positive or negative for decreased sensation to touch or prick and if pain is elicited by brushing against the skin of the foot (Bouhassira et al. 2005). Miller et al. (2014) described a quick but thorough examination for DPN that covers a patient's foot history for event and symptom, a visual exam for inspection with sensation test and a brief time for patient education for foot care. The Semmes Weinstein monofilament examination (SWME) is an inexpensive exam that can be performed by nurses and entered into the chart for review as part of the exam data. The SWME is a validated test for diagnosing DPN and determining the risk for foot ulceration (Feitosa, 2016).

DPN is a chronic pain condition as a comorbidity of Type 2 diabetes (another chronic condition). The chronic care model was developed more than 20 years ago to assist providers in the outpatient setting to improve care through a team effort (Coleman et al. 2009). Porter et al. (2022) recently completed a study that determined primary care providers needed an estimated 26.7 hr per day to provide their patients with the preventative and chronic disease care. A substantial focus on this education project will be given to delegation and streamlining the data collection for DPN screening and assessment. Providing education on diagnostic strategies that are actionable without adding burden to the practice will add to nurse practitioner's self-efficacy and ultimately improve patient care and outcomes.

Nurse Practitioner Education and DPN Burden

Educating nurse practitioners in PCP on the current guidelines for DPN screening and assessment would be incomplete without considering "all the relevant aspects of the

humanistic burden among patients with painful DPN" (Gore et al. 2005). Health care resources, utilization and costs correlate with the degree of pain severity (Sadosky et al. 2013). In addition, patients reported poor sleep quality and higher rates of anxiety and depression with increased pain scores (Gore et al, 2005; Sadosky et al. 2013). Argoff et al. (2006) concluded that the chronic pain of DPN interferes with patient function to a greater degree than other chronic pain syndromes. This conclusion underscores the necessity of good assessment and dialogue between the nurse practitioner, healthcare team, and patient. Yet, "chronic pain has become one of primary care's thorniest burdens" (Seal et al. 2017). The recommendations for pain assessment and management in primary care is to leverage a biopsychosocial approach through integrated-based practice (Seal et al. 2017). The chronic care model provides guidelines to assist with an integrated approach, patient engagement, use of information systems and community resources (Aryani et al. 2016) to meet that need.

The primary goal of managing DPN pain is to improve patient function and decrease the negative impact to the patient's life. The focus of DPN screening and assessment education was to increase the confidence of the nurse practitioner with utilization of the tools and guidelines.

Local Background and Context

The project location was with a local chapter of a nurse practitioner association. The members of the local chapter have communicated to their leaders the need for education on evidence-based guidelines on DPN. The membership of this association is representative of primary care, internal medicine and family practice providers. The

membership indicated that they are unfamiliar with guideline screening and assessment recommendations, methods of specific testing examinations, and strategies for efficient and effective practice protocols. The nurse practitioner members needed education to be able to reduce foot injury, infection, amputation and improve the quality of life and function by applying the recommended guideline actions.

Institutional Context

The DNP education project was implemented via PowerPoint presentation facilitated through the social media account of a local chapter of a nurse practitioner association. Guidelines presented were recommended for primary care in the ambulatory care setting.

State and Federal Contexts

Professional associations are often the source of continuing professional development and current evidence-based practices. Professional associations also serve a role in providing opportunities for continuing education credits needed for state licensure and certification renewals. The association does not require accreditation, but it is responsible to ensure information presented is consistent with standards set forth for by the Centers for Medicare and Medicaid Services (2022) for improvement in services that "seeks to improve patient care and outcomes."

Role of the DNP Student

The professional role of the DNP student in this project was to develop the staff education program. Responsibilities also included coordinating and collaborating with the nurse practitioner association and members regarding the content, delivery, and

dissemination of results. This staff education event supported the nurse practitioner association's role as provider of professional development (Matthews, 2012).

I had hope to reduce the complications from undiagnosed DPN through education of the nurse practitioners on the current DPN assessment guidelines. My potential bias with this project was my belief that providers hear the word "pain" and tend to refer their patients to other specialties. I stayed focused on the facts of pathophysiology and recommendations of guidelines. I also planned to remain open to questions from the participants and tried to engage the participants as partners in practice.

Role of the Project Team

The project team consisted of leadership members of the nurse practitioner association and volunteer members who were primary care practitioners and diabetic educators. The primary care practitioners and diabetic educators were the content experts for the educational seminar. There was one diabetic educator and two primary care nurse practitioners who reviewed the curriculum literature matrix, objectives, and content prior to the education event. After completion of the staff education, the association will assist in application to the national and state nursing associations for continuing education credits for the participants. The leadership members assisted with coordinating the announcement of the seminar to the general membership for the local chapter via email and posting to the social media account. The leadership members also assisted with the technical support needed for the educational seminar.

Summary

The education project for DPN screening and assessment was provided with the use of evidence-based literature that established the need for screening and assessment of DPN along with guidelines for the best method of screening and assessment. The DNP project provided an education to improve nurse practitioner's knowledge with DPN assessment. The goal was to reduce risk of foot injury and decrease healthcare burden of DPN. Meizrow's transformative learning theory and Bandura's self-efficacy theory were used in addition to the ADDIE model to create the educational program for DPN assessment. I review the methods used for data collection and analysis in Section 4.

Section 3: Collection and Analysis of Evidence

Introduction

DPN is a significant complication for diabetic patients. Primary care providers, which includes nurse practitioners, bear the responsibility for screening and ongoing assessment of diabetic patients for DPN. However, clinical guideline studies have noted a lack of screening and diagnosing of DPN in the primary care setting (Sohby, 2017). Failure to screen and assess for DPN misses opportunities for interventions that will prevent neuropathy-related sequelae (Sobhy, 2017). At the project site, the nurse practitioners indicated a lack of knowledge of current evidence-based guidelines and recommendations for DPN screening and assessment. I developed this educational training project to address DPN screening and assessment in the primary care setting. In Section 3, I will review the practice-focused question, describe the sources of evidence I used to develop the educational seminar, and discuss the systems I used to analyze and synthesize the data I collected.

Practice-Focused Question

Professional nursing organizations serve as a network for sharing latest knowledge in practice areas (Matthews, 2012). The nurse practitioner association leadership indicated the membership had expressed a lack of knowledge on current evidence-based guidelines for DNP screening and assessment in the primary care setting. The purpose of the educational project was to provide an update on current guidelines for DPN screening and assessment focused on needs of nurse practitioners in the primary care setting. The practice-focused question was as follows: Will an educational seminar

improve nurse practitioner's knowledge to screen and assess DPN in the primary care setting?

Sources of Evidence

For this doctoral project, I chose the latest, evidence-based research on DPN pathophysiology, screening and assessment. I examined research from professional organizations with findings on DPN tools for assessment and guideline recommendations. I put the educational seminar together after a complete review of the literature. Nurse practitioners who specialize in primary care and in diabetic education assessed the educational seminar prior to the presentation. Participants in the educational seminar completed pre- and posttests anonymously.

Published Outcomes and Research

I reviewed CINAHL, EBSCO, Medline, the CDC, the ADA, and AHRQ to search for peer-reviewed articles on research and best practices and guidelines for assessment of DPN. Selected guidelines were reviewed for best practices that include assessment and diagnostic strategy guidelines.

Evidence Generated for the Doctoral Project

Participants

Nurse practitioners who are members in the professional nurse practitioner association were notified of the educational seminar topic. The participants were nurse practitioners who practice in a wide variety of practice areas. The membership consists of retired, active, and student nurse practitioners. The content experts were nurse

practitioners who are primary care and diabetic educators. All participation was voluntary.

Procedures

When I completed the literature review, I classified the topics (burden, pathophysiology, tools/techniques, guidelines) by the learning objectives I set for the educational seminar. I developed the pre/posttest to assess the educational seminar along with the literature matrix. I presented the objectives and pre/posttests to the project team for review and to make any recommended changes.

The educational seminar was delivered asynchronously as a web-based PowerPoint presentation to the membership of the nurse practitioner association via a link on the social media site. Participants had 1 month of advance notice of the educational seminar. The asynchronous web-based format of the seminar provided a feedback opportunity for questions. Data from the pre- and posttests were analyzed using descriptive statistics to assess the results of the educational seminar.

Protections

There was no direct patient participation or patient data collected for the DNP project. The name of the partner nurse practitioner organization was not identified, and the location of the educational seminar was generalized to a regional area. The nurse practitioner organization chose how to market the educational seminar; however, no identifying information was transferred into the doctoral project document. Participants were given a consent form for anonymous questionnaires (no signature required) prior to submitting responses. The consent form advised the participants of the voluntary nature

of their participation, as well as the risks and benefits, and notified them that responses would be anonymous, private, and confidential. All requirements and forms were completed with Walden's IRB as required and guided by the Walden DNP staff education project manual. Implementation of the DNP project was completed after IRB approval.

Analysis and Synthesis

The goal of the educational seminar was to deliver updated evidence-based guidelines for DPN screening and assessment to nurse practitioners in the primary care setting to reduce DPN complications. I evaluated the pre- and posttest scores with a paired samples *t* test.

Summary

This DNP project was designed to improve nurse practitioner knowledge with guideline recommendations for DPN screening and assessment in the primary care setting. I reviewed the sources of evidence that were used for the educational seminar. After completion of the educational seminar, the project pre- and posttest data were analyzed; findings will be presented in Section 4.

Section 4: Findings and Recommendations

Introduction

The project site had reported a need for education on evidence-based guidelines for DPN screening and assessment guidelines in the primary care setting. I confirmed DPN screening and assessment was a gap in practice in the primary care setting which results in significant complications to diabetic patients. The purpose of the project was to develop an evidence-based program with education to increase nurse practitioners' knowledge with diabetic neuropathy screening and assessment. The practice-focused question I used to guide this project was: Will an educational intervention on diabetic neuropathy assessment and diagnostic guidelines improve nurse practitioners' knowledge with diabetic neuropathy as measured by a pretest and posttest comparison?

Guidelines were researched for best practices recommended for use in the primary care setting. Findings from research and conversations with nurse practitioners in primary care supported a need to prioritize practices that were efficient as well as effective (Porter et al. 2022). Literature reviewed supported evidence-based education for nurse practitioners with updates on assessments and guidelines could improve patient outcomes with DPN (Keneflick et al. 2008; Seal et al. 2017). The use of the 3-minute foot exam (Miller et al. 2014) will promote confidence in the ability to perform the screening and assessment. The recommended screening tools and exams for the primary care setting should be included in the foot exam. A simple yet effective neuropathic pain assessment tool should also be included in the foot exam. Appendices A and B summarize the

literature reviewed for the project and the specific evidence-based literature used to support the curricular plan, respectively.

Findings and Implications

Two primary care experts reviewed the educational program PowerPoint for any changes needed. The educational event was announced as tentative for the week it was offered. The session had to be modified from in person to web-based due to unavailability of meeting location. The educational offering was posted via link on a private social media page. Prior to posting the actual PowerPoint educational content, I posted the invitation to participate in the pre/post study for 5 days. The project site collected 11 participants via messenger and email response.

The educational session was posted for 3 days via web-based recorded PowerPoint presentation. Participants were provided contact information for questions. The project site sent and collected the pre- and posttests (see Appendix C). The pretests were sent to the participants prior to release of the PowerPoint educational session. The project site assigned numbers to the tests as they were completed. I did not have the project site collect demographic data on the participants who responded to participate. No other identifying information was listed on the returned pre- and posttests. Once the participant indicated viewing of the educational presentation, the posttest was sent and returned. The pre- and posttests were the same 10-question exam related to the stated objectives of the educational program. The pre- and posttests were scored and graded with 10 points for every correct answer. I entered the scores into two tables in an Excel spreadsheet and uploaded them into IBM SPSS (Version 28) for analysis.

Formative and Summative Review With Project Site

I had originally developed the content of the educational project through conversations and meetings with a diabetic educator and two primary care providers. The two primary care providers were officers in the nurse practitioner association and available to evaluate the educational program materials. They did not make any recommended changes to the educational content. They did facilitate the administration of the project with approving the posting to social media, emailing membership, and managing sending and returning of the pre- and posttests. The two experts completed the summative evaluation tool (see Appendix D).

Results

The pre- and posttests were completed by 11 participants. I completed a paired-samples *t* test using SPSS (Version 28) to compare the mean pretest score to the mean posttest score to assess the result of the educational intervention. The mean of the pretest was 76.36 (SD = 8.09), and the mean on the posttest was 94.55 (SD = 5.22; see Table 1). A mean increase in scores of 18.18 points indicated knowledge increased. The mean posttest scores (M = 94.55) were 18.18 higher than the mean pretest scores (M = 76.36; see Table 2). The pre- and posttest scores had a positive correlation of r = .43. There was a confidence interval of 95% with statistically significant findings of $p < .001$ (see Table 2).

Table 1

Paired Samples Statistics

Pair 1	*M*	*N*	*SD*	*SEM*
Pretest scores	76.36	11	8.090	2.439
Posttest scores	94.55	11	5.222	1.575

Table 2

Paired Samples Test

Pair 1	Paired differences							Significance	
				95% CI					
	M	*SD*	*SEM*	*LL*	*UL*	*t*	*df*	One-sided *p*	Two-sided *p*
Pretest–posttest scores	-18.182	7.508	2.264	-23.225	-13.138	-8.032	10	<.001	<.001

Note. CI = confidence interval; *LL* = lower limit; *UL* = upper limit.

The analysis of the pre- and posttest score comparison demonstrated an increase in the nurse practitioners' knowledge of DPN screening and assessment in the PCP setting. The educational intervention has the potential to bring about positive social change for this organization, nurse practitioners, nurses, patients and healthcare costs. The nurse practitioners who completed the online educational presentation emailed and posted their insights gained into the risks of DPN to diabetics as well as how significant screening and assessment in primary care could impact outcomes. The evidence-based data on the functionality of the screening tools and exams (Bouhassira et al. 2005; Feng et al. 2011; Miller et al. 2014) was validated by the response of nurse practitioners in this educational project.

The project demonstrates an educational intervention on efficient and effective evidence-based guidelines can be effectively used to improve nurse practitioners' knowledge with DPN screening and assessment in the primary care setting (Sobhy, 2016).

Recommendations

There was an increase in knowledge with this online educational offering. My recommendation is to offer this education annually as part of an update on diabetes guidelines. There may also be an opportunity to include it at the state-wide nurse practitioner annual conference as an educational update. Routine screenings for diabetes can be incorporated into many electronic medical record (EMR) systems; therefore, I have recommended the pain tool and testing tools be added into the EMR flowchart for diabetes in the respective PCPs.

After further discussion with the nurse practitioner association regarding ongoing professional development support, I have recommended a committee to review the members' needs for practice topics. Members indicated they would like to have an opportunity to contribute to educational content for their own professional development, to keep current with practice guidelines, and to network with each other.

Contribution of the Doctoral Project Team

The project team involved two nurse practitioner association leadership officers (member services and secretary), the diabetic educator member, and several colleagues (members) whom I spoke with throughout the development of the project. The nurse practitioner leaders were largely responsible for coordinating the delivery of the

educational project. They also contributed, along with the diabetic educator, to the quality of educational content and quality of delivery.

Strengths and Limitations of the Project

This doctoral project met the objective of increasing nurse practitioner knowledge with DPN screening and assessment in the primary care setting. The strengths of the project include the support from the nursing association throughout the development of the educational content and assessment of best method of delivery. A significant strength of the project was that it was developed with the needs of the primary care providers' time challenge and frustrations with providing timely and quality care to their patient population (Porter et al. 2022).

Limitations of the project was the changing target date due to the association's challenge with securing a meeting place. The low turnout in meetings has been impacted by the COVID-19 pandemic restrictions and the inability to secure a regular meeting site. The other limitations were low sample size and lack of background of participants. An online offering does not have to be a limitation if it can be added as a hybrid offering to an in-person meeting. However, a future educational offering that would ask participants about their years of experience and practice/degree specialty may offer suggestions for improvements.

Section 5: Dissemination Plan

The results of this educational project have been presented to the nurse practitioner association leadership. The leadership agreed with the ongoing need for continuing education. The results will be reviewed at the next association meeting and recommendations presented for discussion.

The continuing objective of this project will be the improvement of outcomes for DPN in the diabetic patient. This educational program could be offered at other nurse practitioner associations and nursing groups across all practice settings.

Analysis of Self

The project has helped me to appreciate my efforts as an educator, a collaborator, a networker and a project developer. All these roles were needed to identify a gap in knowledge, assess the evidence, the best method to close the gap and develop the process to implement it. I had a difficult time finding a site to deliver an education event. I work alone in my own practice setting. Even after finding the practice setting with a nurse practitioner association, it took persistence to push for an educational opportunity through all their meeting challenges.

I had originally wanted to educate nurse practitioners on chronic pain management guidelines. I changed to educating and empowering nurse practitioners with assessing DPN. At first, I thought this was a low-level project with not much content to offer. What I discovered is that all assessment is about the basics of care. And good nursing always begins and ends with the basics. It was a worthy project.

The other realization I gained is that despite the many challenges with trying to meet with others and lack of time to try to complete the project itself, I love to motivate and inspire people to believe in what they can do. It felt very good to encourage others. The lone practice I am in as a provider isolates me from my colleagues. This project made me realize the value of membership and attending association meetings.

Summary

The goal of this project was to assess whether an evidence-based educational intervention would increase nurse practitioners' knowledge with DPN screening and assessment in primary care. The results of the pre- and posttest scores showed that the participants increased their knowledge and met the objectives set for the intervention. The project has the potential to improve outcomes for screening and assessment DPN patients in the primary care setting.

References

Adams, A. S., Callaghan, B., & Grant, R. W. (2017). Overcoming barriers to diabetic polyneuropathy management in primary care. *Healthcare (Amsterdam, Netherlands)*, *5*(4), 171-173. https://doi.org/10.1016/j.hjdsi.2016.10.003

American Association of Nurse Practitioners. (2022). *NP fact sheet*. https://www.aanp.org/about/all-about-nps/np-fact-sheet

American Diabetes Association. (2019). *Standards of Medical Care in Diabetes-2019* abridged for primary care providers. *Clinical Diabetes*, *37*(1), 11–34. https://doi.org/10.2337/cd18-0105

Ang, L., Cowdin, N., Mizokami-Stout, K., Pop-Busui, R. (2018). Update on the management of diabetic neuropathy. *Diabetes Spectrum*, *31*(3), 224–233. https://doi.org/10.2337/ds18-0036

Argoff, C. E., Cole, B. E., Fishbain, D. A., & Irving, G. A. (2006). Diabetic peripheral neuropathic pain: Clinical and quality-of-life issues. *Mayo Clinic Proceedings, 81*(4), S26-32. https://doi.org/10.1016/s0025-6196(11)61474-2

Aryani, F., Lee, S., Chua, S. S., Kok, L. C., Efendie, B., & Paraidathathu, T. (2016). Chronic care model in primary care: Can it improve health-related quality of life? *Integrated Pharmacy Research and Practice*, *5*, 11–17. https://doi.org/10.2147/IPRP.S92448

Bandura, A. (1994). Self-efficacy. In V.S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). Academic Press. (Reprinted from *Encyclopedia of mental health*, by H. Friedman, Ed., 1998, Academic Press).

Bartol, T. (2012). Improving the treatment experience for patients with type 2 diabetes: role of the nurse practitioner. *Journal of the American Academy of Nurse Practitioners*, *24*(Suppl 1), 270–276. https://doi.org/10.1111/j.1745-7599.2012.00722.x

Bodman, M. A., & Varacallo, M. (2022). Peripheral diabetic neuropathy. In *StatPearls*. StatPearls Publishing. https://pubmed.ncbi.nlm.nih.gov/28723038/

Bouhassira, D., Attal, N., Alchaar, H., Boureau, F., Brochet, B., Bruxelle, J., Cunin, G., Fermanian, J., Ginies, P., Grun-Overdyking, A., Jafari-Schluep, H., Lantéri-Minet, M., Laurent, B., Mick, G., Serrie, A., Valade, D., & Vicaut, E. (2005). Comparison of pain syndromes associated with nervous or somatic lesions and development of a new neuropathic pain diagnostic questionnaire (DN4). *Pain*, *114*(1-2), 29–36. https://doi.org/10.1016/j.pain.2004.12.010

Callaghan, B. C., Cheng, H. T., Stables, C. L., Smith, A. L., & Feldman, E. L. (2012). Diabetic neuropathy: Clinical manifestations and current treatments. *The Lancet Neurology*, *11*(6), 521–534. https://doi.org/10.1016/S1474-4422(12)70065-0

Carmichael, J., Fadavi, H., Ishibashi, F., Shore, A. C., & Tavakoli, M. (2021). Advances in screening, early diagnosis and accurate staging of diabetic neuropathy. *Frontiers in Endocrinology, 12*. https://doi.org/10.3389/fendo.2021.671257

Centers for Disease Control and Prevention. (2020). *National Diabetes Statistics Report, 2020*. U.S. Department of Health and Human Services. Retrieved July 8, 2022 from https://www.cdc.gov/diabetes/data/statistics-report/index.html

Centers for Medicare and Medicaid Services. (2022). *2022 Annual call for quality measures fact sheet: Quality Payment Program.* https://www.cms.gov/files/document/mips-call-quality-measures-overview-fact-sheet-2022.pdf

Coleman, K., Austin, B. T., Brach, C., & Wagner, E. H. (2009). Evidence on the chronic care model in the new millennium. *Health Affairs*, *28*(1), 75–85. https://doi.org/10.1377/hlthaff.28.1.75

Feitosa, T. F., Dos Santos Dantas, M. Q., Da Silva, C. B., & Pereira, A. (2016). Monofilament for preventing the diabetic foot: An integrative review of the literature. *Online Brazilian Journal of Nursing*, *15*(2), 291-301. https://doi.org/10.17665/1676-4285.20165277

Feng, Y., Schlösser, F. J., & Sumpio, B. E. (2011). The Semmes Weinstein monofilament examination is a significant predictor of the risk of foot ulceration and amputation in patients with diabetes mellitus. *Journal of Vascular Surgery*, *53*(1), 220–226.e5. https://doi.org/10.1016/j.jvs.2010.06.100

Flandt, K. (2006) Chronic care model: Description and application for practice. *Topics in Advanced Practice Nursing*, *6*(4). https://www.medscape.com/viewarticle/549040

Formosa, C., Gatt, A., & Chockalingam, N. (2016). A critical evaluation of existing diabetic foot screening guidelines. *The Review of Diabetic Studies*, *13*(2-3), 158–186. https://doi.org/10.1900/RDS.2016.13.158

Furno, M. (2014). The primary role: How the availability of primary care physicians affects diabetes care management. *The Journal of Medical Practice Management*, *30*(2), 139-143.

Gore, M., Brandenburg, N. A., Dukes, E., Hoffman, D. L., Tai, K. S., & Stacey, B. (2005). Pain severity in diabetic peripheral neuropathy is associated with patient functioning, symptom levels of anxiety and depression, and sleep. *Journal of Pain and Symptom Management*, *30*(4), 374–385. https://doi.org/10.1016/j.jpainsymman.2005.04.009

Gore, M., Brandenburg, N. A., Hoffman, D. L., Tai, K. S., & Stacey, B. (2006). Burden of illness in painful diabetic peripheral neuropathy: The patients' perspectives. *The Journal of Pain*, *7*(12), 892–900. https://doi.org/10.1016/j.jpain.2006.04.013

Hicks, C. W., & Selvin, E. (2019). Epidemiology of peripheral neuropathy and lower extremity disease in diabetes. *Current Diabetes Reports*, *19*(10), Article 86. https://doi.org/10.1007/s11892-019-1212-8

Institute of Medicine. (1996). Defining primary care. In *Primary care: America's health in a new era*. National Academies Press. https://doi.org/10.17226/5152

Keneflick, H., Lee, J., & Fleishman, V. (2008). *Improving physician adherence to clinical practice guidelines: Barriers and strategies for change*. New England Healthcare Institute. https://www.nehi.net/writable/publication_files/file/cpg_report_final.pdf

Kurt, S. (2017). ADDIE model: Instructional design. *Educational Technology*. https://educationaltechnology.net/the-addie-model-instructional-design/

Lin, J., Thompson, T. J., Cheng, Y. J., Zhuo, X., Zhang, P., Gregg, E., & Rolka, D. B. (2018). Projection of the future of diabetes burden in the United States through 2060. *Population Health Metrics*, *16*(1), Article 9. https://doi.org/10.1186/s12963-018-0166-4

Matthews, J. H. (2012). Role of professional organizations in advocating for the nursing profession. *OJIN: The Online Journal of Issues in Nursing, 17*(1), https://doi.org/10.3912/OJIN.Vol17No01Man03

Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education*, *74*(1997). https://doi.org/10.1002/ace.7401

Miller, J. D., Carter, E., Shih, J., Giovinco, N. A., Boulton, A. J., Mills, J. L., & Armstrong, D. G. (2014). How to do a 3-minute diabetic foot exam. *The Journal of Family Practice*, *63*(11), 646–656.

Pop-Busui, R., Boulton, A. J. M., Feldman, E. L., Bril, V., Freeman, R., Malik, R. A., Sosenko, J. M., & Ziegler, D. (2017). Diabetic neuropathy: A position statement by the American Diabetes Association. *Diabetes Care*, *40*(1), 136-154. https://doi.org/10.2337/dc16-2042

Porter, J., Boyd, C., Skandari, M. R., & Laiteerapong, N. (2022). Revisiting the time needed to provide adult primary care. *Journal of General Internal Medicine*, https://doi.org/10.1007/s11606-022-07707-x

Sadosky, A., Schaefer, C., Mann, R., Bergstrom, F., Baik, R., Parsons, B., Nalamachu, S., Nieshoff, E., Stacey, B. R., Anschel, A., & Tuchman, M. (2013). Burden of illness associated with painful diabetic peripheral neuropathy among adults seeking treatment in the US: Results from a retrospective chart review and cross-sectional survey. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, *6*, 79–92. https://doi.org/10.2147/DMSO.S37415

Seal, K., Becker, W., Tighe, J., Li, Y., & Rife, T. (2017). Managing chronic pain in primary care: It really does take a village. *Journal of General Internal Medicine*, *32*(8), 931–934. https://doi.org/10.1007/s11606-017-4047-5

Semmes–Weinstein monofilament. (n.d.) In J. C. Segen, *Concise Dictionary of Modern Medicine*, 2002. McGraw-Hill. https://medical-dictionary.thefreedictionary.com/Semmes%e2%80%93Weinstein+monofilament

Sobhy, T. (2016). The need for improved management of painful diabetic neuropathy in primary care. *Pain Research & Management*, *2016*, 1974863. https://doi.org/10.1155/2016/1974863

Stino, A. M., & Smith, A. G. (2017). Peripheral neuropathy in prediabetes and the metabolic syndrome. *Journal of Diabetes Investigation*, *8*(5), 646–655. https://doi.org/10.1111/jdi.12650

Wukich, D., Frykberg, R., Zgonis, T., Moore, J., Schuberth, J., Andersen, C., & Vanore, J. (2006). Diabetic foot disorders: A clinical practice guideline (2006 revision). *The Journal of Foot and Ankle Surgery*, *45*(Suppl. 5), S1-S66. https://www.academia.edu/17563553/Diabetic_Foot_Disorders_A_Clinical_Practice_Guideline_2006_Revision_

Yang, H., Sloan, G., Ye, Y., Wang, S., Duan, B., Tesfaye, S., & Gao, L. (2020). New perspective in diabetic neuropathy: From the periphery to the brain, a call for early detection, and precision medicine. *Frontiers in Endocrinology*, *10*, 929. https://doi.org/10.3389/fendo.2019.00929

Zamani-Alavijeh, F., Araban, M., Harandy, T. F, Baslami, F., & Almasian, M. (2019). Sources of health care provider's self-efficacy to deliver health education: A qualitative study. *BMC Medical Education*, *19*(16). https://doi.org/10.1186/s12909-018-1448-z

Appendix A: Literature Review Summary Matrix Table

Author/date	Title	Target population	Analysis/results	Implications for practice
American Diabetes Association (2019)	Standards of Medicare Care in Diabetes - 2019 Abridged for Primary Care Providers.	diabetic patients	recommendations by ADA to use chronic care model for decision support with clinical information systems, recommendations for screening, assessment and diagnosis of diabetic neuropathy	Up to 50% of DPN may be asymptomatic, nurse practitioners need to incorporate the foot screening/assessment and diagnosis guidelines specific to DPN as recognition and treatment can prevent the dire consequences of foot infections/ulcers and amputations.
Argoff et al. (2006)	Diabetic peripheral neuropathic pain: clinical and quality of life issues	diabetic patients	Reviews recommendations for diagnostic assessment of DPN based on literature review: includes definitions of pain, validated neuropathic pain scales and key elements to diagnosis of DPN	Nurse practitioners need accurate definition of pain terms and appropriate tools to assess pain in order to implement treatment choices to impact outcomes
Bodman & Varacallo (2022)	Peripheral Diabetic Neuropathy	diabetic patients	review of evaluation and management of diabetic neuropathy including differential diagnosis and staging of DPN	Providers need an understanding and knowledge base of disease presentation in order to determine a clinical decision pathway
Bouhassira et al. (2005)	Comparison of pain syndromes associated with nervous or somatic lesions and development of a new neuropathic pain diagnostic questionnaire (DN4)	diabetic patients	A review of the DN4 questionnaire for neuropathic pain examined and validated for a sufficient tool for assessing neuropathic pain in daily practice	The use of screening/questionnaires that align with brief exam compliments the actionable assessment strategy for the PCP setting
Feng et al. (2011)	The Semmes Weinstein monofilament examination is a significant predictor of the risk of foot ulceration and amputation in patients with	diabetic patients	literature review of SWME testing: patients with +SMWE are increased risk for foot ulceration (2.5 - 5 times higher)	SMWE is an inexpensive, accurate and non-invasive method to assess DPN risk in the PCP setting. It is a screening tool and does not take the place of the exam; it can be part of the data collected by medical staff in the PCP office.

Author/date	Title	Target population	Analysis/results	Implications for practice
	diabetes mellitus			
Formosa et al. (2015)	A critical evaluation of existing diabetic foot screening guidelines	diabetic patients	Critical review of foot screening guideline	nurse practitioners/ providers developing practices to address gaps will need to recognize limitations of guidelines
Gore et al. 2005	Pain severity in diabetic peripheral neuropathy is associated with patient functioning, symptoms level of anxiety and depression, and sleep	adult DPN patients across primary care, endocrinology, neurology and pain management settings	Data collected via brief pain inventory, sleep scale, anxiety and depression scale, and health survey	Assessment of DPN must include comprehensive data for an accurate picture of the psychosocial burden of pain related to DPN.
Hicks & Selvin (2019)	Epidemiology of peripheral neuropathy and lower extremity disease in diabetes	diabetic patients	Review summarized the epidemiology, risk factors, and management of diabetic peripheral neuropathy	PN eventually affects over 50% of patients diagnosed with diabetes; pain foot ulcers, falls, lower limb amputations - defines needs for prioritizing assessment
Miller et al. (2014)	How to do a 3-minute diabetic foot exam	diabetic patient population	Outline of exam with clinical decision criteria for continued assessment vs referral	The use of a comprehensive assessment strategy that is actionable is a significant consideration in a busy primary care setting
Pop-Busui et al. (2017)	Diabetic neuropathy: A position statement by the American Diabetes Association	diabetic patients	Review of recommendations for prevention, screening and diagnosis, complications, pain management for DPN and associated neuropathy syndromes	A thorough assessment for a patient's own medical history, symptom history to include pain and/or lack of sensation to take place in primary care setting
Sadosky et al. (2013)	Burden of illness associated with painful diabetic peripheral neuropathy among adults seeking treatment in the US: results from a retrospective chart review and cross-sectional survey	adult DPN patients in primary and specialist sites	Data collected on specific burden to symptoms, functional impairments, loss of productivity and healthcare costs	Assessment of DPN pain for effective management strategies is a necessity in order to improve quality of life across several outcome measures.

Appendix B: Curriculum Plan for Assessment of DPN

LEARNING OBJECTIVES:

- Describe the prevalence and burden of DPN
- Review the clinical features and process of differential diagnosis of DPN
- Identify steps in the comprehensive foot evaluation for patients with DPN
- Review the current guideline and risk classification recommendations for diagnosing and screening for DPN

Learning objective	Detailed content outlined	Source of evidence	Method of presentation	Method of evaluation
Describe the prevalence and burden of DPN	Burden of illness associated with DPN: described in healthcare costs, symptoms severity, loss of productivity, function Data collected via pain inventory, sleep scale, anxiety and depression scale, and health survey	Sadosky et al. (2013) Gore et al. (2005)	PowerPoint	Pretest/Posttest Item #2, #5
Review the clinical features and process of differential diagnosis of DPN	Describes etiology and risk factors for DPN: hyperglycemia, dyslipidemia, insulin resistance influence to aid in differential diagnosis Reviews differential diagnosis of diabetic neuropathies to review: metabolic disease, systemic disease, infectious, inflammatory, nutritional, toxic and hereditary	Hicks et al. (2019); Argoff et al. (2006); Bodman & Varacallo (2022) Pop-Busui et al. (2017)	PowerPoint	Pretest/Posttest Item #1, #6, #8
Identify steps in the comprehensive foot evaluation for patients with DPN	Outline of exam with clinical decision criteria for continued assessment vs referral DN4 questionnaire for neuropathic pain examined and validated for a sufficient tool for assessing neuropathic pain in daily practice	Miller et al. (2014); Feng et al. (2011) Bouhassira et al. (2005)	PowerPoint	Pretest/Posttest Item #3, #7
Review the current guideline and risk classification recommendations for diagnosing and screening for DPN	Decision support with clinical information systems, recommendations for screening, assessment and diagnosis of diabetic neuropathy Critical review of foot screening guidelines – use of guideline will help implement strategies to improve outcomes through prevention and appropriate treatment & referrals	American Diabetes Association (2019) Formosa et al. (2015)	PowerPoint	Pretest/Posttest Item #4, #9, #10

Appendix C: Pre/Posttest

1. True or False.

   The intensity of pain with DPN always indicates the severity of the sensory deficit.

2. DPN is responsible for approximately _____ of diabetic costs in the United States

   a. 10%
   b. 25%
   c. 75%
   d. 33%

3. Tests for DPN in the primary care setting are (mark all that apply)

   a. Monofilament testing
   b. Vibration testing
   c. EMG/nerve conduction studies
   d. Visual circulation and dermatological assessment

4. The American Diabetes Guideline recommends the following frequency for screening and assessment for DPN in Type 2 DM

   a. On diagnosis and annually thereafter
   b. On diagnosis, then annually; every 3 months if screening is positive
   c. Every 3 months
   d. Only when patient has symptoms of pain or ulcer

5. The most significant complication of DPN for the diabetic patient is:

   a. Pain
   b. Infection
   c. Amputation
   d. Uncontrolled blood sugars

6. DPN usually presents with all except

   a. Symmetrical pattern
   b. Pain worse in the day
   c. Burning pain
   d. Numbness

7. True or False

   A review of patient foot care practices is a part of the DPN screening and assessment recommendation

8. Differential diagnosis of neuropathy to be considered include all except

   a. Thyroid disorder
   b. Toxic metal exposures
   c. Alcohol abuse
   d. Obesity

9. True or False

   Routine screening and assessment of DPN in primary care will provide opportunities for preventative measures and improve patient outcomes.

10. A recommended validated and effective pain screening tool for clinician and patient is

    a. DN4
    b. GAD
    c. A1C
    d. VAS

Appendix D: Review of Educational Program Materials

Expert Information
Date
Organization
Position

Material	Like	Dislike	Change	Comments
Curricular Plan				
PowerPoint				
Pre/Posttest				

Additional Comments