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Walden University

College of Health Sciences

This is to certify that the doctoral study by

JennyAnn Managbanag

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. Mary Verklan, Committee Chairperson, Nursing Faculty

Dr. Amelia Nichols, Committee Member, Nursing Faculty

Dr. Mary Martin, University Reviewer, Nursing Faculty

Chief Academic Officer

Eric Riedel, Ph.D.

Walden University

2018

Abstract

Evidence-Based Practice Guideline for Peripheral Artery Disease

by

Jenny Ann S. Managbanag

MSN, Olivet Nazarene University, 2014

BSN, Silliman University, 1995

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

August 2018

Abstract

The absence of a practice guideline for peripheral artery disease (PAD) in the cardiology department creates differing practice preferences among providers, leading to deviations in practice among staff. Variations in practice can affect the quality of care that is provided to patients. This project was guided by research statements indicating that there was a difference in the screening approach for PAD among health practitioners at preimplementation and postimplementation and that an 85% compliance with the guideline would signify consistency in the provision of care. Rogers' theory of diffusion of innovations was used to facilitate the adoption of the guideline. This project helped close the gap between research (adoption of a guideline) and practice (compliance in the use of evidence in clinical practice). Using random medical record reviews and pretest-posttest design, the results of the project showed that patterns of using the PAD guideline in practice at preimplementation significantly differed compared to postimplementation. The rates of screening for the compliance of the PAD guideline showed approximately an eightfold increase. The adoption of the PAD guideline has implications for policy, because adopting the PAD practice guideline helped standardize care, improve effectiveness of care in nursing practice, evaluate quality through use of research, and promote social change by improving patient outcomes.

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Dedication

This DNP project is dedicated with love to my family. To my children Edcel, Alyana, Aryn, Amihan, and Haje, you gave me reason to keep moving forward. My prayers that you will always use the talents that God has bestowed on you. To my husband, your encouragement and steadfast support allowed me to complete this journey even if it means taking on more responsibilities. To my parents, who always believed the value of education and pursuing opportunities.

“Being confident of this very thing, that He which hath begun a good work in you will perform it until the day of Jesus Christ.”

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To my children and husband who saw me go through this whole program. They shared my frustrations, took over the chores in the house so I may be able to work on the project hours after hours, understood why I cannot spend so much time with them as they want me to. Without their support, this would not have been anywhere near possible.

To God, all glory to His name.

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Section 1: Nature of the Project

Introduction

The cardiology department in this study serves an adult population diagnosed with cardiac-specific conditions to vascular-related health problems. Responding to the ever-increasing stream of new data and evolving evidence in cardiology is challenging for a busy practitioner. Providers and nurses in the cardiology department of the Health System recognized the need for specific directions to standardize care to commonly encountered conditions such as peripheral artery disease (PAD). Therefore, this project was directed toward the adoption of a clinical practice guideline in the care of patients with PAD in the cardiology department of the Health System. The evidence-based practice guideline can help standardize diagnostic activity and maintain consistency of care for this patient population. The guideline can assist providers and nursing staff in instituting appropriate clinical decisions and provide concise instructions for the management of the patient with PAD. Section 1 will include the background of the practice problem, the problem statement, purpose, practice-focused questions, goals and objectives, the framework of the project, nature of the project, definitions, assumptions, scope and delimitations, limitations, and the significance of the project.

Background

The Health System is a small community health organization located in Wisconsin. The cardiology department has three interventional cardiologists, two general cardiologists, a vascular/cardiothoracic surgeon, two nurse practitioners, and seven registered nurses. The department primarily provides care for patients 18 years old and

above with cardiovascular conditions, including PAD. The outpatient department, the site of the scholarly project, has a volume of approximately 300 patients per week.

Because of a lack of practice guidelines related to PAD, the responsibility of assessment of the patient has been at the discretion of the provider. With the absence of a standardized tool, providers have practiced according to their preferences. Furthermore, the lack of a guideline has also decreased diagnostic accuracy, as the provider made clinical decisions as to what would be an effective intervention that might not be based on the evidence. Finally, the absence of a guideline had left the nursing staff unsure in providing instructions and targeting appropriate care for this patient population. The use of an evidence based guideline through this project can allow nurses and providers the consistency of fully participating in identifying risk factors for PAD, educating the patients of their condition, monitoring treatment compliance, and providing consistent patient care.

Problem Statement

The lack of a guideline for the care and management of patients with PAD has encouraged practice variations among providers and left the nursing staff with no clear direction regarding patient management. Because of the variations in practice, providers have exclusively followed their patients during their hospitalizations for fear that the other providers would not manage their patient in the same way. There have also been disagreements regarding best patient management strategies between providers despite the patients having identical clinical problems. Inconsistencies between care providers has created conflict among providers and staff, and created confusion for the patients.

Evidence-based tools can assist health care providers in making clinical decisions based on evidence (Jun, Kovner, & Stimpfel, 2016).

At the study site, nurses lacked confidence in their fellow nurses' abilities to provide consistent care because of the lack of knowledge on how to proceed. There was no clarity on interventions with evidence of being beneficial for the patients; thus, nurses were unable to provide the best education experience for the patients. The lack of a guide and knowledge deficit on PAD also prevented the nurses from qualifying signs or symptoms of the disease and might have caused them to overlook improper responses to interventions. They were also unable to alert fellow clinicians of inappropriate interventions because they were unaware of what good practice in PAD care should be. The Bureau of Labor Statistics (2015) released the employment data indicating registered nurses as the greatest number of provider group. Nurses are significant assets in outpatient care. They contribute to quality care and implementing clinical practice guidelines; thus, ensuring understanding of recommended practice on PAD care can influence positive patient outcomes (Jun et al., 2016).

Beginning the third week of January 2017, the department transitioned into a service-line type of care delivery model. Each of the three interventional cardiologists was responsible to provide coverage for the clinic, inpatient services, and cardiac catheterization laboratory one week at a time. Although the patients would still retain their primary cardiologist, for urgent care, the cardiologist who was covering the outpatient area, cardiac catheterization laboratory, or inpatient services would treat any patient who happened to be in their rotation. With the current practice of patient

management, the lack of consistency in practice would create efficiency barriers and worsen the ambiguities involved in the management of patient care.

Purpose

The purpose of this project was to adopt an evidence-based clinical practice guideline for the medical and nursing care of patients with PAD. The guideline was used in the outpatient setting of the cardiology department for the care, diagnosis, and treatment of patients with PAD. It was intended to establish a standard of care based on the evidence in delivering care for this patient population to improve the effectiveness and quality of patient care by reducing different care approaches in clinical practice (Kredo et al., 2016). It was also intended to measure quality for reporting and evaluation of outcomes (Kredo et al., 2016).

The use of the PAD guideline can assist clinicians and nursing staff to develop a standard expectation as to the management and coordination of care that was shown to be beneficial while preventing the use of ineffective measures. In an event when there is a debate over evidence, the clinical practice guideline can become the mediator, as decisions are based on clinical experience, expert opinions, and potential harms (Woolf et al., 2012). Furthermore, use of the guideline can resolve the current provision of individual medical practice approach of patient management in the same manner regardless of the managing provider and staff. As a result, the guideline promotes superior and consistent delivery of services, which is reflective of best practice, is equitable, is cost effective, and is proven to improve health outcomes for this patient population.

Practice-Focused Statements and Project Objectives

The project was guided by the following practice-focused statements:

1. There was a difference in the screening and approach of care for PAD among cardiology nurses, nurse practitioners, and physicians in the 3-month period before the guideline was introduced as compared to the 3-month period following the implementation of the PAD guideline.

2. After 3 months of implementation of the PAD guideline, a minimum of 85% compliance of the use of the PAD guideline by the cardiology nurses and providers would signify consistent provision of standard care for PAD.

The first objective was to adopt the guideline of the most updated version for this study was the American College of Cardiology Foundation/American Heart Association (ACCF/AHA) PAD practice guideline (Rooke et al., 2011). The most updated version for this study was the 2011 AACF/AHA focused update of the guideline for the management of patients with PAD. The contents of the guideline would include clinical assessment of patients for PAD, diagnostic methods, preventive and treatment measures, management of complications, and follow-up care (Appendix A).

The second objective was for the Health System to adopt the guideline through a practice protocol and a PAD order set that reflected the contents of the recommendations. The guideline can be administered to all patient encounters during routine office visits in the cardiology department. Patients who are identified at risk for PAD will go through the appropriate management process as provided for in the guideline.

The third objective was to introduce the tool to the nurses, nurse practitioners, and physicians. The presentation of the guideline would occur during the cardiology staff meeting to discuss the appropriate use of the guideline. The introduction of the guideline would be an opportunity to incorporate suggestions on ease of use unique to the setting of the department.

The fourth objective was to establish that the PAD guideline increases the rate of screening of patients by at least 85%. The set goal for the compliance rate indicated that there was consistency in providing standardized care by following the PAD guideline. Screening was determined during routine patient visits in the outpatient cardiology clinic 3 months prior to the implementation of the guideline and 3 months following implementation of the guideline. The information was obtained by a retrospective review of 30 medical records chosen at random and a prospective review of 30 medical records randomly chosen.

Frameworks for the Project

The implementation of the evidence-based guideline can help standardize the practice of screening patients for PAD. To facilitate the adoption of the guideline, the project was guided by Rogers' theory of diffusion of innovations. Diffusion, as defined in the theory, is a "process by which an innovation is communicated through certain channels over time among members of a social system" (Rogers, 2010, p. 5). The theory consists of four elements: innovation, communication channels, time, and social system.

Innovation in this study refers to the evidence-based practice PAD guideline that would be introduced to the health organization. Its adoption or rejection would depend

on the knowledge, persuasion, and decisions of the innovation-decision process. The communication channel is the means by how change was transmitted to individuals or a group. Time pertains to how the cardiology staff would embrace the new process. The quantification of time was dependent on the adoption or rejection of the practice guidelines, the earliness or lateness of adoption, and the rate of adoption, which refers to the number of members who have elected to embrace the innovation. Social system helped define how innovation was represented and facilitated or impeded the diffusion of innovation. A comprehensive application of the theory and the model for the project will be further discussed in Section 2.

Nature of the Project

To evaluate the impact of the PAD guideline, a pretest-posttest design was used. The pretest was the baseline measurement of the frequency of screening the patients for PAD while the posttest design helped the frequency of screening the patients for PAD after the guideline had been implemented (Hunt, 1999; Terry, 2015). The definition of guideline acceptance at the Health System was determined by at least 85% with the use of the PAD practice guideline.

The nurses, nurse practitioners, and cardiologists in the cardiology department of the health system used the guideline. The data on frequency of use was collected via review of patient's medical records 3 months prior to the implementation of the practice guideline and 3 months after the introduction of the PAD guideline. More detailed information regarding the methodology will be discussed in Section 3.

Definitions

The following section was developed to clarify and define the terms and abbreviations referenced throughout the paper:

Adoption: The clinicians committed to start using the PAD guideline.

Antithrombotic therapy or antiplatelet therapy: A term used to describe a group of drugs to maintain patency of the lumen of the arteries following diagnosis and percutaneous intervention for reduction of risk of cardiovascular events related to PAD (Bodansky, Allon, Apostolakis, & Lip, 2015). Recommended antithrombotic therapy for primary prevention of cardiovascular events is aspirin (75-100 mg/day). The recommended secondary prevention for cardiovascular events and post peripheral intervention (peripheral arterial bypass surgery or percutaneous transluminal angioplasty) is long-term aspirin (75-100 mg/day) or clopidogrel (75 mg/day) therapy (Alonso-Coello et al., 2012).

Atheroembolism: A complication of a ruptured atherosclerotic plaque, which causes renal impairment and skin lesions (Lang, 2009). The impaction of these cholesterol crystals in the smaller arteries became irreversible leading to stenosis and ischemia (Lang, 2009). This condition is alleviated either by mechanical interventions such as percutaneous or surgical procedures, and/or administration of anticoagulation to impede a stabilizing thrombus (Lang, 2009).

Clinical practice guideline for PAD: The clinical practice guideline developed by the ACCF/AHA systematic review of evidence that contained recommendations to assist health care practitioners in providing care of PAD patients (Kredo et al., 2016). The

clinical practice guideline signified directives for clinicians in the screening, counseling, and treatment of this patient population.

Claudication: A lower extremity pain that was characterized as a reproducible discomfort of one or more group of muscles such as the buttocks, hip, calves, thighs, or foot that was generated during exercise and was relieved with rest (Gerhard-Herman et al, 2017).

Critical limb ischemia (CLI): A condition that might be caused by atheroembolism (Shishehbor et al., 2016). Presenting symptoms included tissue loss, gangrenous digits or foot and were associated with pain, paresthesia, severely decreased or absent pulses (Gerhard-Herman et al, 2017; Shishehbor, 2016).

Compliance: Adherence and adaptation of nurses, nurse practitioners, and physicians to the use of the PAD guideline implemented in the cardiology department. The context of this behavior change did not indicate use of the guideline in its entirety. It did require the users to start on the first component at the initial encounter. The subsequent components of the guideline would only occur if the preceding component indicated the need to proceed based on the positive finding/s obtained.

Dissemination: The introduction of the PAD practice guideline to cardiology department for use in the clinic setting.

Glycemic control: The aggressive attempt at regulating serum glucose levels to decrease the risk of adverse cardiovascular events and complications associated with PAD (Camafort et al., 2011).

Implementation: The stage by which clinicians in the cardiology department used the PAD guideline.

Innovation: The change in practice, which was the PAD practice guideline.

Maintenance/Sustainability: The clinicians had decided to accept or refuse the use of the PAD guideline.

Peripheral artery disease (PAD): The accumulation of lipid and fibrous materials in the arterial walls, which led to gradual narrowing of the lumen causing symptoms of insufficient blood flow, obstruction, and atheroembolization (Olin et al, 2016; Gerhard-Herman et al., 2017).

Risk factor modification: Recommended secondary preventive measures such as: Supervised exercise, antithrombotic therapy, smoking cessation, cholesterol-lowering medications, control of diabetes and hypertension. The above activities were directed at reducing the risk of future cardiovascular events and the control of the progression of plaque buildup (Olin, 2016; Solomon, Kullo, & Rooke, 2016).

Assumptions

The first assumption was that given 3 months following introduction of the guideline nurses, nurse practitioners, and physicians would be receptive to the use of PAD guideline as the tool to standardize practice in the cardiology department. The theory of diffusion of innovations indicates that change when communicated appropriately within a department will attain a level of understanding towards the benefit of using the tool (Rogers, 2010). The second assumption was that the sample charts obtained for this project would be reflective of the clinic population from which to

generalize the results. The third assumption was that the evidence-based recommendations of the clinical practice guideline for PAD was an effective tool for making decisions in the provision of clinical services in the cardiology department. These services included risk screenings, counseling services, preventive medications, and treatment therapies that would improve the health of the population it served. Consistency of use would determine positive patient outcomes.

Scope and Delimitation

The focus of the project was directed for the cardiology department and the screening of PAD. The project provides the most updated guideline in the diagnosis and management of patients with lower extremity PAD. I further evaluated its use in clinical practice following 3 months after implementation. Adoption of the guideline was determined by a compliance of greater than or equal to 85% of the use of the PAD screening tool.

A delimitation of the project was that only the cardiology department of one hospital was used. Another delimitation was that data collection could only occur following a 3-month period from the introduction of the guideline. Third, the diagnosis of lower extremity PAD excluded aneurysmal and non-obstructive arterial diseases of the lower extremities. The PAD guideline only refers to the anatomical location to only include iliac and lower extremity arteries.

Limitations

The first limitation was that this project was the first clinical practice guideline introduced in the organization, and therefore, its acceptance in clinical practice could not

be predicted based from a previous experience. The second limitation pertained to the variability of acceptance of the clinical practice guideline by each health care personnel given the 3 months allocated time between introduction of the PAD clinical guideline to the time of data collection. Each nurse, nurse practitioner, and cardiologist had their own unique perception of patient care and reception of change despite the strength of evidence presented.

Significance

The significance of the project is its influence on standardizing practice among nurses, nurse practitioners, and physicians using the most updated evidence in the routine care of PAD patients in the cardiology clinic (see Woolf et al., 1999). Its greatest significance is in decreasing risks of PAD patients from cardiovascular events and complications associated with PAD (see Grenon et al., 2013). The evidence on effective management and surveillance strategies led to efficient delivery of health care services for this population.

Potential Contributions to Advance Policy

The clinical practice guideline for PAD reflected organizational, political, cultural, and economic perspective of care based on the following: (a) It increases awareness of the burden of the disease by highlighting the health problem, the clinical services and preventive interventions, and the neglected PAD population and high-risk patients; (b) Existing services in the health organization can be made available as a result of the PAD guideline; (c) It promotes public good by emphasizing distributive justice, better delivery of health care services, and cost-effective, service efficient for PAD

patients (White, 2012; Woolf et al., 1999). The understanding of evidence-based practice pertaining to PAD was not limited to health care providers. Microsystem, system leaders, and policy makers must equally recognize the value of evidence so that a public consensus on beneficiaries of care, cost of services, and clinical care of the population can be formulated (Bodenheimer & Grumbach, 2016; Stevens, 2013).

Implications for Social Change

The PAD practice guideline was consistent with the Healthy People 2020 goal on promoting health, preventing disease and disability, eradicating health disparities, and improving health outcomes (USDHHS, 2017). PAD has been closely linked to uncontrolled diabetes, hypertension, tobacco abuse, and the increased risk of cardiovascular events (Olin et al., 2016; Grenon et al., 2013). The rigorously developed interventions specified in the PAD guideline help promote effective management of the disease and co-existing conditions, potentially reducing mortality and morbidity, and improving quality of life (Woolf et al., 1999). The PAD guideline can influence patient empowerment in making informed healthcare choices on best treatment options appropriate for their condition (Woolf et al., 1999). As a result, the project helps advocate and promote a culture of safety, excellence in practice, and consistency of care for the target population and the broader community (White, 2012).

The PAD guideline can improve communication within the cardiology department because it offers clear guidance among the health care professionals who were unsure on how to proceed to the next step (Woolf et al., 1999). The clinical practice guideline can also constitute as the authoritative recommendation that is expressed in a

health system policy and order set, which can dispel doubts from practitioners as to the appropriateness of interventions used for the care of this patient population. The PAD guideline can serve as the auditing reference of individual clinician and health system practices, whereby the plan of care and interventions became the review criteria for practitioner compliance and conduct of best care practices (Woolf et al., 1999).

Summary

PAD is an atherosclerotic, obstructive disease, which can lead to ischemia, increased risk of cardiovascular events, and disease-related complications. Early diagnosis, appropriate management, and close monitoring based on evidence have been shown to improve patient outcomes. The adoption of a clinical practice guideline for the cardiology department can standardize practice and assisted in decision-making of health care practitioners in the care for PAD patients. The objectives of the project were focused on the adoption and implementation of the guideline into clinical practice, incorporating the recommendations via a practice protocol/order set reflecting the evidence and introducing the tool to the staff so that its use on patients in the clinical setting can be validated in clinical practice. Rogers' theory on diffusion of innovations was used as the analytic framework to facilitate the development, implementation, and evaluation of the clinical practice guideline for PAD. The project was developed so that compliance to the PAD guideline, as the most current evidence, might improve practice, bring positive patient outcomes, influence policy, and contribute to social change. A practice comparison before and after implementation of the practice guideline was statistically analyzed via pretest-posttest design. Section 2 will include results of the data relevant to

the project. It will also include the concepts and framework used for the project and the background and context specific for this project.

Section 2: Background and Context

Introduction

The absence of a practice guideline for the care of patients diagnosed with PAD promoted diversity in patient management in the study site for this project, leaving the nursing staff with no consistent instructions related to the individualized plan of care for these patients. Thus, the purpose of the project was to adopt an evidence-based practice guideline to assist nurses and physicians to provide the standard of care reliably to each patient. Section 2 will be focused on the appraisal of data source, discuss the concepts, model, and the theory that were used to develop this project. Also included in this section is the literature review related to methods, and the project's background and context.

Literature Search Strategy

The search strategy for the literature review was conducted using the following databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), ProQuest, Medline, EBSCO, Google Scholar, PubMed, Cochrane Database of Systemic Review, American Heart Association, and American College of Cardiology. The key terms searched were *peripheral artery disease*, *peripheral vascular disease*, *lower extremity vascular disease*, and *peripheral artery disease practice guidelines*.

The search generated 359 results specific or related to the subject. These articles were further sorted using abstracts and latest practice updates using only the literatures published in 2010 until the present. Studies that were specific to the interventional aspect of PAD, specific medication reviews, editorials, non-peer reviewed journals, and comanagement of other disease conditions were excluded. The 11 articles that used for

this DNP project consisted of supporting literature, a meta-analysis, a clinical trial, systematic reviews, evaluation study, the most current guideline on PAD, and a related literature on practice guideline on wound healing for arterial ulcers to provide support to the research question and the purpose of the project.

Concepts, Models, and Theories

The introduction of a PAD practice guideline was guided by Rogers' theory of diffusion of innovations. Diffusion is a special process whereby change is transmitted within members of the health organization in a given time (Rogers, 2010). The change innovation was the process by which the members of the cardiology department would adopt using the guideline. The four elements in the theory that influenced the successful implementation of the project were: innovation, communication channels, time, and social system. These theoretical concepts provided the foundation that would be used for the implementation of the project.

The first element was innovation, which consisted of the introduction of the PAD practice guideline in the cardiology department. The concept of the innovation did not indicate new information, as many of the recommended practices had been implemented. The second element of the theory, the communication channel, was the PAD practice guideline. The content of the practice guideline was the means of communication that represented the information exchange among individual members of the department. The third element, time, was measured by the percentage of the providers' frequency of use of the innovation over time, which was after 3 months from the time the guideline was introduced. The social system comprised of the members of the cardiology department

who would use the guideline and how they would determine how the innovation would be diffused. In this element, norm relationships, opinions of staff, department leaders, and change agents were considered.

The adoption of the PAD practice guideline by clinicians was due to multiple factors such as relative advantage, compatibility, complexity, trialability, and observability. Some of these factors might require more of effort to allow for diffusion to take place. The concept of relative advantage referred to the clinician's perception that the PAD guideline was better than the current practice of clinical management of PAD (Sanson-Fisher, 2004). It was important to emphasize that the introduction of this evidence-based project was not just for the benefit of the patient but also the clinician, and the healthcare system (Sanson-Fisher, 2004). The second concept was compatibility as the diffusion of the PAD practice guideline had to be consistent with the values, past experiences, and needs of the cardiology department (Dingfelder & Mandell, 2011; Sanson-Fisher, 2004). Complexity was the degree of difficulty in using the PAD guideline (Dingfelder & Mandell, 2011). The innovative guideline was straightforwardly adopted by the physicians, nurse practitioners, and nurses if it was simple to use and there was clarity in the content. Trialability was the extent by which the PAD practice guideline can be tested and modified (Sanson-Fisher, 2004). Finally, the diffusion of the PAD guideline was also influenced by the concept of observability, where results of the change process were visible to others (Sanson-Fisher, 2004).

Frameworks

The cardiology department providers' commitment to accept, adopt, and use the PAD practice guideline was not an instant process, but an undertaking consisting of the four stages of: dissemination, adoption, implementation, and maintenance/sustainability that provided the foundation in the Diffusion of Innovation Model (Figure 1). The dissemination stage was when the PAD guideline was introduced into the cardiology department for use in the clinic setting. The adoption stage was when clinicians embraced the new guideline. It was in this stage that attitudes concerning the guideline were formed and commitment to use the new guideline was determined. Implementation was when clinicians used, changed, and modified the guideline. Finally, the maintenance or sustainability of the project referred to the cardiology department providers' decision to accept the change or reject the use of the practice guideline. It was within this framework that the concepts of relative advantage, compatibility, complexity, trialability, and observability, as discussed above, predicted the outcome of the change process.

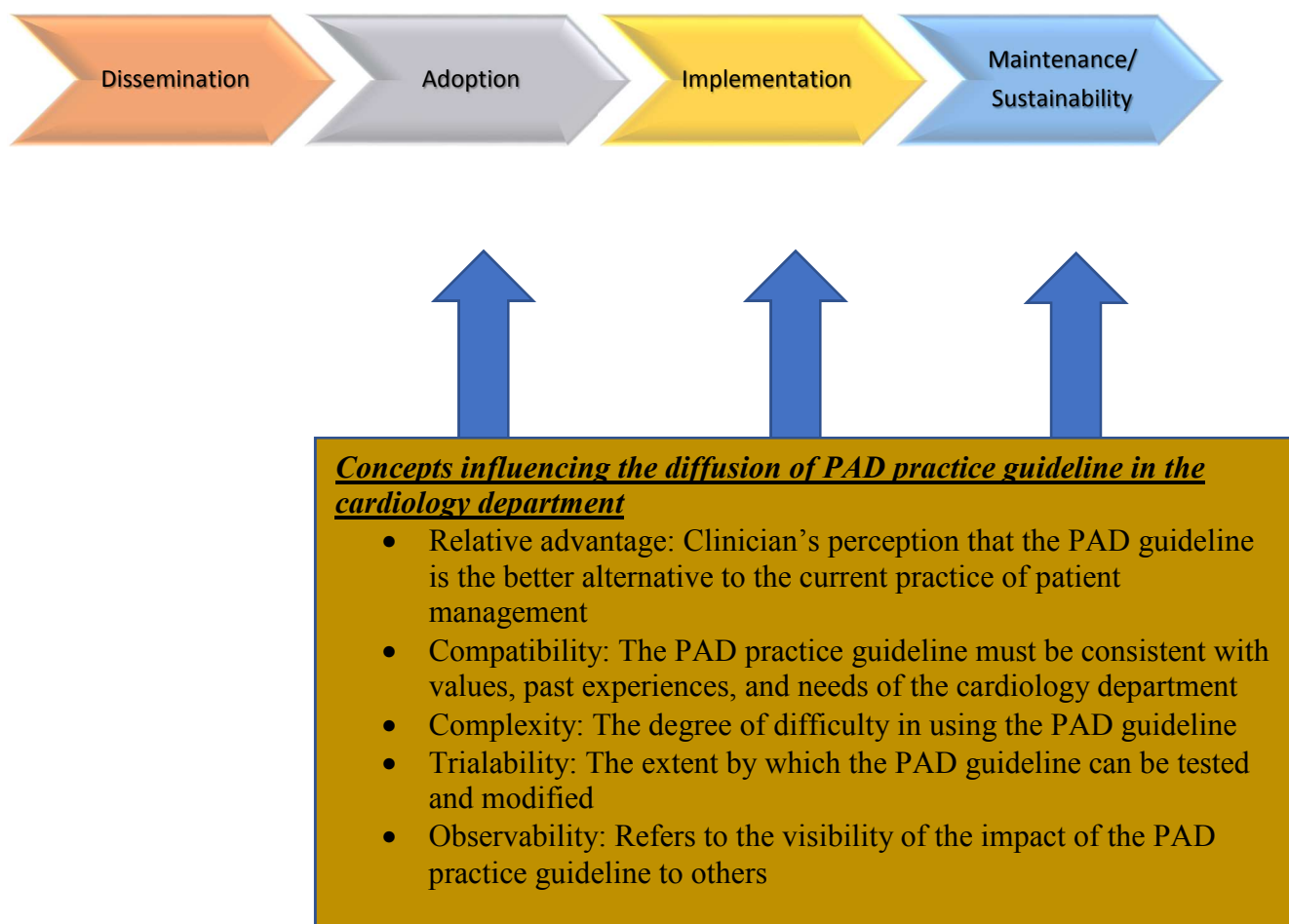


Figure 1. The diffusion of innovation model. Adapted from “Bridging the research-to-practice gap in autism prevention: An application of innovation theory,” by H. E. Dingfelder and D. S. Mandell, 2011, *Journal of Autism Developmental Disorder*, 41, 597-609. Adapted with permission.

Literature Review Related to Methods

PAD has been frequently overlooked due to the poor understanding of the disease. The lack of knowledge of the disease can lead to undiagnosed, undertreated disease condition, and inappropriate treatment of the risk factors leading up to the disease or prevention of the consequences of poorly-managed PAD. The knowledge deficit within the health care team can then lead to failure to provide safe patient care.

Berger and Ladapo (2017) supported the need to improve quality of care for PAD patients in their investigation of the patterns of use of contemporary medical therapy and lifestyle counseling in patients with PAD in the United States. They found that of the 3,883,665 ambulatory visits in an 8-year period, coronary artery disease was a comorbid condition representing 24.3% of the visits. Additionally, the use of the medication for cardiovascular prevention and symptoms of claudication was low: 35.7% of antiplatelet therapy, 33.1% in statins, 28.4% in ACEI/ARB, and 4.7% in cilostazol. Exercise and diet counseling was used in 22% of the visits: 35.8% of visits discussed smoking cessation counselling, or 35.8% of medications used for current smokers. The patient presenting with PAD with a coexisting diagnosis of coronary artery disease was more than likely to receive antiplatelet therapy in ambulatory visits (odds ratio of 2.6), as compared to those who were diagnosed with PAD alone. Berger and Ladapo concluded that the use of guideline-recommended therapies for PAD was lower; therefore, they highlighted a gap in practice and the need to improve quality of care for PAD patients.

Gandhi, Weinberg, Ronan, and Jaff (2011) reviewed the current medical management of patients with PAD and emphasized the importance of a comprehensive approach including cardiovascular risk factor modification as an adjunct to the management of lower extremity symptoms. Risk factors, as defined by the American College of Cardiology (ACC)/American Heart Association (AHA) guideline include management of diabetes mellitus, treatment of dyslipidemia, tobacco cessation, hypertension control, antiplatelet and antithrombotic therapy, and medical management of limb symptoms. Treatment for limb symptoms included exercise therapy, weight loss, and pharmacologic agents. The research highly recommended an aggressive approach from clinicians to seek out individuals who were at high risk of developing the disease. The findings supported the DNP project purpose for effectiveness of care and improving patient outcomes by actively pursuing patients at risk for PAD and developing a comprehensive program to lower these risks towards decreasing cardiovascular morbidity and mortality, improve function, limb outcomes, and quality of life.

Pandey et al. (2017) conducted a meta-analysis of seven trials to validate the efficacy of initial endovascular treatment with or without supervised exercise training (SET) versus SET alone in patients with intermittent claudication. The method sought to evaluate the results by measuring the primary outcome of treadmill-measured walk distance at the end of follow up. The study was also interested in secondary outcomes, which were resting ankle brachial index (ABI) and treadmill-measured ischemic claudication distance on follow-up. It was found that concomitant endovascular therapy and SET showed marked improvement, at 12.4 months follow up, in total walking

distance, ABI, and risk of future revascularization or amputation. The findings indicated that endovascular therapy alone had no bearing on the functional capacity or clinical outcomes in the intermediate duration of follow up. Initial revascularization must complement SET. In the same manner, the DNP project was aimed at finding best practice evidence that evaluated outcomes while avoiding use of ineffective measures in patient care. The diffusion of innovation or compliance of practice guideline among health care providers was better achieved when observability of results was evident among members of the healthcare team.

Olin et al. (2016) conducted a systematic review of evidence to discuss the evidence-based approach on the management of PAD patients. Effective therapies specific to SE, pharmacotherapy, and revascularization to improve walking, claudication symptoms, and quality of life were examined. It was found that a 12-week intervention of SE improved exercise performance and quality of life such that it had become a Class I recommendation. Optimal medical therapy such as smoking cessation, pharmacotherapy to improve claudication symptoms, use of angiotensin converting enzyme inhibitors (ACEI), statins, and antiplatelet therapy was found to provide multifactorial risk reduction pertaining to PAD progression, prevention of cardiovascular events and overall mortality benefit. The study also demonstrated that revascularization through percutaneous or surgical means was proven to reduce the risk of tissue or limb loss if SE and optimal medical therapy failed to improve symptoms. These recommendation supported the purpose of the project to develop a PAD guideline to guide healthcare practitioners in the approach of PAD management.

Slovut et al. (2014) investigated the compliance of ACCF/AHA PAD guidelines used in the management of patients specifically after lower extremity revascularization. Quality of care (QoC) was determined by calculating provider performance on the four indicators of antiplatelet therapy, dyslipidemia management, control of hypertension, and diabetes. Quality of care scores were computed at the time of admission and at the time of discharge based on the individual treatment that each patient received. Seven hundred thirty-four subjects were enrolled, who underwent lower extremity revascularization due to claudication, rest pain, and tissue loss and followed for a period of 1.4 to two years. The results showed that a significant QoC score was noted during hospital admission and that race/ethnicity were significant multivariate predictor of perfect QoC score. It was also found that advanced age, heart failure, chronic kidney disease, and more advanced LE ischemia was strongly associated with decreased event-free survival from amputation, repeat revascularization, and death. It was concluded that despite improved adherence to guidelines, a gap continued to exist between guidelines and practice for this cohort of patients at risk for adverse cardiovascular events. The DNP project sought to bridge that gap by establishing the PAD guideline in outpatient practice setting to reinforce compliance and promote quality of care and brought out positive patient outcomes.

Pineda, Kim, and Osinbowale (2015) conducted a systematic review on the impact of pharmacologic interventions on PAD. The review emphasized the role of pharmacology at improving claudication symptoms, risk-factor modification, and the role of antiplatelet therapy in reducing major adverse clinical events and promoting arterial patency following peripheral intervention. It was suggested that further studies were

needed to evaluate the role of pharmacotherapy in providing clinical benefit, which in turn cost effective options than endovascular interventions. Pharmacotherapy was an essential aspect of PAD management. As such, the DNP project on PAD guideline used different pharmacologic interventions to control this debilitating, life-threatening disease process by controlling comorbid conditions, appropriate use of antiplatelet agents, and optimization of therapy following revascularization and/or patients who were too high risk to qualify for revascularization. The article provided a rigorous outcome data or cost-efficacy information to guide clinicians in making decisions in managing patients with PAD.

Bodansky, Allon, and Apostalakis (2014) investigated how suboptimal antithrombotic therapy influenced the long-term outcome of PAD patients who were receiving guideline-recommended antithrombotic therapy. The methodology included searching for ICD-10 codes on admission. Patient records were searched for ICD-10 codes on admission and for comorbidities and initiation of adequate antithrombotic therapy on discharge (Bodansky, Allon, & Apostalakis, 2014). There were 236 (70.2%) patients discharged on optimal antithrombotic therapy, 30 (8.9%) were considered “over-treated” and 70 (20.8%) were undertreated. Heart failure patients were mostly undertreated while patients with coronary artery disease were “over-treated.” In addition, undertreated patients had increased risk of for all-cause mortality and cardiovascular mortality. It was concluded that suboptimal antithrombotic therapy specific to the cohort was not uncommon. The study implicated the value of antithrombotic treatment following peripheral angioplasty for lumen patency and decreased risk of developing

major cardiovascular events such as stroke and myocardial infarction (MI). The article thus, lent support to the purpose of the project to improve effectiveness and uniformity of care for better health outcomes.

Phillips et al. (2015) conducted a systematic review that evaluated the evidence surrounding exercise interventions and the mechanisms that govern endothelium-dependent vasodilation and its role in the prevention and/or rehabilitation of endothelial dysfunction, which was present in PAD. The mechanism of exercise training impacted the arterial function by improving insulin sensitivity, alleviating insulin resistance, increased regenerative capacity, and decreased inflammatory markers and oxidative stress. The DNP project sought to establish various methods in clinical practice such as exercise training, a non-pharmacologic intervention, that was considered best practice yet cost effective, measurable, and equally proven to bring positive results.

Federman et al. (2016) discussed updates of the Wound Healing Society 2014 guidelines for arterial ulcers. The guideline provided recommendations on the levels of evidence surrounding the seven categories of arterial ulcer management. These seven categories referred to diagnosis, surgery, infection control, wound bed preparation, dressings, adjuvant therapy, and long-term maintenance. The guideline reiterated the importance of the restoration of blood flow by revascularization to assure wound healing. The guideline also stressed the benefit of adequate management of co-existing medical conditions such as diabetes, hypertension, and smoking, among other related conditions, that equally affected PAD. Although the guideline addressed various ways to promote

wound healing, it demonstrated the importance of establishing a PAD guideline to appropriately manage patients with PAD and comorbid conditions.

Kim et al. (2014) recognized the silent nature of PAD and the ambiguity of a physical examination that can mask the true presence of PAD. The authors developed the peripheral artery questionnaire (PAQ), a screening tool for diagnosing patients with high suspicion of PAD. They aimed to demonstrate the clinical validity of the PAQ by investigating its association with ABI in patients with intermittent claudication (IC), and whether PAQ could better determine reduced ABI as compared to the Edinburg claudication questionnaire (ECQ). The diagnostic threshold for PAD diagnosis was an ABI of 0.90 correlated with the PAQ summary score. A summary score was the average calculation of the physical limitation, symptoms, quality of life, and social functioning (Kim et al., 2014). The scores ranged from zero to 100, which fifty represented no change and score >50 or <50 represented improvement or worsening of symptoms, respectively (Kim et al., 2014). The results showed that a low PAQ summary score was predictive of a low ABI (≤ 50.3) leading to the conclusion that the PAQ summary score was associated with increased possibility of PAD in patients suspected of manifesting PAD symptoms. The study supported the use of disease-specific health status measurements as disease management tools in conjunction with risk assessments to promote patient outcomes and cost-effective, patient-centered healthcare system (Kim et al., 2014). The result of the study could lend support in the development of the PAD guideline in the screening of patients for the presence of PAD.

Gerhard-Hermann et al. (2017) revised the 2016 guideline on the management of patients with lower extremity PAD in response to the Institute of Medicine mandate to evaluate new knowledge to its relevance at the point of care (Gerhard-Hermann et al., 2017). The conversion of evidence into practice through this guideline was aimed towards improving cardiovascular health and quality of patient care. The guideline explored the areas of clinical assessment, diagnostic testing, screening, medical therapy, structured exercise therapy, prevention of tissue loss, revascularization, management of CLI and acute limb ischemia, and gaps and future research directions. The updated recommendation supported the purpose of the project to develop a guideline for management of PAD in the cardiology department.

Background and Context

The PAD guideline was adopted to benefit a small, non-profit community hospital located in the southern part of Wisconsin. It served the locality and its surrounding communities. Peripheral artery disease cases came to the cardiology department through inter-departmental referral, patient complaints, or acute cases. In addition, patients diagnosed with the disease failed to follow up due to the absence of a monitoring process. Yet, the health system had no screening, monitoring, or treatment guideline and protocols in place to identify and retain the patient population diagnosed with PAD. The overall identification and management initiatives of PAD might have improved, however, the number of patients with the disease and its morbidity continued to rise (Olin et al., 2016). Thus, the use of the PAD guideline into clinical practice in the cardiology department would standardize patient identification and diagnosis, gave clear direction on patient

care and monitoring, and bridged the gap between evidence and acclaimed positive patient outcome. However, the critical aspect of this implementation was the unanimous acceptance of the DNP project within the cardiology department. Therefore, the project would seek to examine the degree of diffusion of this innovation as evidenced by at least 85% of use of the PAD guideline.

Role of the DNP Student

I would assume the role as the project leader in this DNP project to facilitate the adoption of the PAD guideline for the clinical management of PAD into the outpatient clinical setting. The topic was chosen after it was observed during clinical rotation that there was no guideline in place for use in the management of this patient population. My role would involve spearheading the use of the protocol and the guideline, enhancing the staff knowledge on PAD through the content of the guideline, and how the guideline was used in each patient encounter. By taking an active role in the DNP project, I would be instrumental in encouraging standardization of practice based on evidence, preventing fragmentation of care, and promoting patient safety. Consequently, I would be responsible in evaluating the degree of adoption of the guideline. The project concept reflected the AACN Essentials of Doctoral Education for Advanced Nursing Practice (2006) the need for change in the organization, and the integration of practice immersion. Thus, my role as a DNP student would be to promote advanced nursing practice that was sensitive to organizational and systems leadership centered on practice, ongoing quest to improve health outcomes, and safeguarding the health of the clientele through a scholarly nursing practice (AACN, 2006).

Summary

The PAD practice guideline would standardize the care management of patients with PAD in the identification, treatment and monitoring of their disease condition. The implementation of this change process was guided by the theory of Diffusion of Innovations. It would utilize the framework to include related concepts and the four stages of the theory that would predict the outcome of the change implementation within the background and context unique to the local organization. The search strategy was focused on terms pertaining to PAD and current evidence and recommendations. The literature review examined these recommendations that focused on clinical assessment, diagnostic testing, screening, medical therapy, exercise, decreasing tissue loss, revascularization, and management of PAD complications. The lack of a guideline prompted me to create a PAD guideline for use in the cardiology department.

Section 3: Collection and Analysis of Evidence

Introduction

The lack of a practice guideline for the care of patients with PAD promoted variation in practice among providers at the hospital observed in this project. Variant forms of clinical practice can lead to inconsistencies in the provision of patient care among nurses, nurse practitioners, and physicians. Thus, the project helped mainstream expectations as to screening, intervention, and monitoring of this patient population in the cardiology department. The clinical practice guideline was aimed to provide quality by addressing issues unique to the local organization related to service delivery, health outcomes, and use of evidence within the health organization. Section 3 will include the methods used to justify the approach, data collection process, data analysis, and synthesis of the data that would be obtained.

Approach and Rationale

The intention of the DNP project was to establish a standard of care based on evidence so that consistent, effective, and quality in the management and coordination of care was maintained among clinicians. Therefore, the project initiative was to ultimately seek to determine the compliance of the use of the PAD guideline, which indicated that the standard of care in PAD management was maintained in clinical practice. To determine the project outcome, a pretest-posttest design was used. The rationale for choosing this design was to compare the frequency of PAD assessment in the outpatient clinical practice before and after the introduction of the guideline and to measure the impact of the change intervention after the PAD guideline was implemented in the

cardiology department (Dmitrov & Rumrill, 2003; Knapp, 2016). There were five main components in the guideline: clinical assessment, diagnostic testing, management after confirmed diagnosis, management of complications, and follow-up monitoring. Nurses, nurse practitioners, and physicians were educated on these components and how it was being used in the clinical setting. The pretest established the frequency of screening prior to the intervention and compared the frequency of assessment after the establishment of the guideline. The before and after comparison provided a clear description of the effect of the practice change to the day-to-day routine of patient management (Dmitrov & Rumrill, 2003; Knapp, 2016).

Population and Sampling

The target population for this project consisted of full-time, part-time, and per diem medical assistants, nurses, nurse practitioners, and physicians who provided services for patients in the cardiology department. The educational attainment of the providers involved a medical degree and completion of a fellowship in cardiology and/or interventional cardiology. The nurse practitioners have masters and/or Doctor of Nursing Practice degrees. The nurses have associate's or bachelor's degrees. These personnel primarily used the PAD guideline in every patient encounter. The training on the appropriate use of the PAD guideline was provided based on the unique role of each personnel in every patient encounter. Personnel were taught on how to use and progress through each component depending on patient responses. Assessment of the use of the guideline by these personnel was reflected in patient records and questionnaire.

A simple convenience random assignment was used. Two sets of chart reviews were randomly examined. The first set include 30 medical records, 10 from each of the months of April, May, and June, 2017 randomly chosen to be representative of the patient population before the PAD guideline was introduced. The timeline for this chart review was April-June, 2017. The second set of chart reviews consisted of 30 medical records, 10 from each of the months of July, August, and September, randomly selected to be representative of the practice after the implementation of the PAD guideline. The fundamental concept of random assignment as described in the project sampling was the appropriate assignment of medical records before the guideline was introduced, and after the guideline was implemented to allow determination of frequency and consistency of PAD assessment before and after the guideline was put in place (see Terry, 2015).

Ethical Protection of Participants/Human Subjects

Data collection commenced after approval was granted by the Walden University Institutional Review Board (IRB). An IRB approval from the health system was also obtained prior to collecting data. The review of data did not involve actual patient contact; however, it required use of the electronic health records of patients. Access to the electronic health records was safeguarded with username and password login. Confidentiality was maintained on all data obtained and used exclusively for the project's purpose. Identifying information of the provider or patient contained in the records was not part of the data required to answer the research questions. However, these identifiers were needed to obtain the necessary information that was critical to the success of the project. The integrity of all unique identifiers and data collected for this project are

protected and kept in my personal computer that was password protected, firewall secured, with an antivirus software in place, and located in a locked private office.

Data Collection

Data were collected using random chart audits. The criteria for review included seven components based on the extensive literature review: (a) the clinical assessment for PAD; (b) diagnostic testing for those suspected with the lower extremity PAD; (c) medical therapy (pharmacotherapy, smoking cessation, glycemic control, and blood pressure control); (d) structured exercise therapy; (e) revascularization; (f) management of complications (as applicable); and (g) follow-up monitoring.

The first step was the retrospective collection of data for the pretest group or preimplementation data. These patient records consisted of 30 medical records chosen at random from patient encounters in the cardiology office from April through June, 2017. With the permission from the health system, I logged into the Cerner health electronic records. After a successful login, the home screen readily displayed the list of patients that would be seen for the day. To search the list of patients on the target date, I manually entered the specific month, day, and year in the calendar to access daily schedules of office encounters that transpired during April through June, 2017. Ten individual patient encounters were selected each month. On the month of April, three medical records were chosen every other week alternating it with two medical records on the two remaining weeks. A random selection of two patient encounters each week was done for the months of May and June. Patient names and identifiers were de-identified and entered in a code sheet entitled Pretest Group (Appendix B) until 30 patients were identified. Once

completed, I began searching individual patient encounters and reviewed the frequency of PAD assessment based on the components of the PAD guideline.

The implementation of the PAD guideline was necessary to establish a policy/protocol for management of this patient population in the cardiology department. Permission to develop this project was granted by the Director of the Cardiology Services and the providers. The PAD guideline was based on the 2011 national guidelines for managing lower extremity PAD and the literature review conducted for this project. The guideline (Appendix A) was presented to the weekly providers' cardiology meeting for approval. After permission for use was granted, the tool was presented during the staff meeting. Instructions were provided on how the guideline was used using a checklist-form of an order set. A week of pilot testing took place to allow the staff to become comfortable in using the instrument. A three-month implementation was established to allow the nurses, nurse practitioners, and physicians to become familiar with the use of this new tool.

The third step was the prospective collection of data for the posttest group or post-implementation data. Similar to the procedure during the retrospective data collection, patient records consisted of 30 medical records chosen at random from patient encounters in the cardiology office from July-September, 2017. I logged into Cerner electronic health records. Once successful login was completed, the home screen appeared, which allowed me to locate the list of patients by manually entering the specific month, day, and year in the calendar to access the daily schedule of office encounters that transpired during July through September, 2017. Ten individual patient encounters were selected

each month. On the months of July and September, three medical records were chosen every other week alternating it with two medical records on the two remaining weeks. A random selection of two patient-encounters each week was done for the month of August. To maintain confidentiality, patient identifiers were masked and listed in a code sheet entitled, posttest group (Appendix B) until thirty patients were identified. Once completed, I began searching individual patient encounters and reviewed the PAD assessment based on the components of the PAD guideline.

Data Analysis

To calculate the compliance of the PAD guideline, it was critical that the statistical approach must establish a compliance score. Compliance, operationally used as a continuous variable, should reflect a meaningful zero point so that an absolute value could be assigned to each component being measured (Polit, 2016). To establish the compliance score, a descriptive analysis of the components of the PAD guideline, such as mean, median, overall distribution, and standard error was summarized. The descriptive analysis was further presented into a graphic expression of linear regression (coefficient of determination) and correlation (Pearson r) to determine distribution and dispersal of data for each specific time line (Polit, 2016; Terry, 2016). A slope was also determined for pre- and post-intervention data to determine the significance of the linear relationship, specifically with regards to determining compliance. Once the data were assigned, data was converted into percentages to compare rates of screening for PAD pre- and post-implementation of the PAD guideline. A t test was used to prove that there was a significant relationship or magnitude of the impact of the intervention implemented in the

population of interest (Polit, 2016). A 95% confidence interval (CI) for the mean difference between pre-implementation assessment versus post implementation assessment for PAD. The analysis of data obtained was performed with the use of the Statistical Package for the Social Sciences (SPSS) Version 24 and Word Excel Version 16.9.

Evaluation Plan

The evaluation of the project effectiveness was guided by Roger's theory of Diffusion of Innovations. The transmission of the change implementation was a continuous process as healthcare providers transitioned from one element to the next. These elements referred to: (1) innovation, which was the introduction of the PAD guideline; (2) communication channel, the PAD guideline; (3) time- allotted to use the guideline; and, (4) social system, who were the users of the guideline. The goal of ongoing evaluation was to determine whether the PAD guideline was used and the effectiveness of the project during the daily routine of patient management (White & Dudley-Brown, 2012). Relative advantage, compatibility, complexity, trialability, and observability were factors that provided sources of feedback on the usefulness and appropriateness of the PAD guideline. Therefore, as the project was used in daily practice, practice review was conducted frequently to determine the consistency of the use of the guideline (Gillam & Siriwardena, 2014). These reports were discussed at the end of the week during cardiology staff meetings. Suggestions on how to improve the utility of the tool would be documented. Corrections took effect every following week. At the end of the project evaluation, a final review and analysis of the strengths,

limitations, and the future needs of the PAD guideline to assure 85% compliance of use and sustainability of the change implementation was completed (White & Dudley-Brown, 2012).

Summary

The method used to determine compliance of the use of the PAD guideline was the pretest-posttest design. Using the components identified in the guideline, frequency of screening for the PAD population was determined before and after implementation of the guideline. The population targeted for the project were the nurses, nurse practitioners, and physicians in the cardiology department. Using simple convenience random assignment, two sets of chart reviews were conducted for the periods of April-June, 2017 representing pre-implementation of the project and the months of July-September, 2017 representative of the data after the guideline was introduced. Data collection commenced after approval was granted by the Walden University and health system IRB. Meticulous efforts were maintained to uphold the confidentiality of the patient records. The implementation of the PAD guideline transpired after approval was received from the management of the cardiology department. Its use included training the staff in its content and use. A week of pilot testing was completed. The collection of data required login into the Cerner health electronic records to audit 30 randomly selected charts to describe the pre-implementation assessment and 30 randomly chosen charts representative of the post-implementation data. Data analysis established a value of the compliance with the use of descriptive analysis, linear regression, Pearson correlation, and *t* test to determine if there was significant difference after the guideline was established. Percentage of compliance

was determined based on the significant values (p) derived from each sample cases. The evaluation plan was based on Roger's theory of Diffusion of Innovation. Weekly appraisal of the use of the guideline was discussed along with subsequent corrections. A final project evaluation was completed at the end of the DNP project. Section four would describe the findings of the project, its implications, strengths and limitations, and analysis of the role played by the DNP student.

Section 4: Findings, Discussion, and Implications

Introduction

The purpose of the DNP project was to adopt an evidence-based clinical practice guideline for the clinical staff of a cardiology department in the care delivery of patients with PAD. The improvement initiative was guided by two practice-focused statements: (a) there is a difference in the screening and approach of care for PAD among cardiology nurses, nurse practitioners, and physicians in the 3-month period before the guideline was introduced as compared to the 3-month period following the implementation of the guideline, and (b) after 3 months of implementation of the PAD guideline, a minimum of 85% compliance of the use of the PAD guideline by the cardiology nurses and providers will signify consistent provision of standard of care for PAD. Section four includes the results of the pre- and post-implementation data regarding the impact of the project and frequency of use of the PAD guideline. It will also provide the findings and discuss the results through support of evidence, its relevance based on the framework used for this project, implications for policy, practice, research, and social change. In this section, I will also discuss strengths and limitations of the project, and analysis of self as a scholar, practitioner, developer, and the project's contribution toward my professional development.

Summary and Evaluation of Findings

The purpose of the project was to adopt the clinical practice guideline for PAD in the cardiology department studied for this project. The adoption was guided by the practice-focused statements: (a) There is a difference in the screening and approach of

care for PAD among cardiology nurses, nurse practitioners, and physicians in the 3-month period before the guideline was introduced as compared to the 3-month period following the implementation of the PAD guideline, and (b) after 3 months of implementation of the PAD guideline, a minimum of 85% compliance of the use of the PAD guideline by the cardiology nurses and providers will signify consistent delivery of the standard of care for PAD. To answer the practice-focused statements, the identified objectives were to:

1. Adopt the 2011 updated version of the ACCF/AHA PAD practice guideline.
2. Develop the guideline into a practice protocol and PAD order set for use in the cardiology department.
3. Introduce the tool to the nurses, nurse practitioners, and physicians.
4. Establish the consistency of use of the guideline through evaluation on the rate of patient screening by at least 85%.

Objective 1: Adopts the 2011 Updated Version of the ACCF/AHA PAD Practice Guideline.

The adoption of the 2011 ACCF/AHA PAD practice guideline as the innovation, was discussed during staff meetings with the cardiology department leaders, physicians, nurse practitioners, and nurses to identify elements pertinent to the care delivery of patients in the department. The foundational efforts to improve the clinical practice in the cardiology department involved identifying the specific elements surrounding the adoption of the guideline. These elements referred to clinical assessment, diagnostic methods, preventive and treatment measures, management of complications, and follow-

up care. Multiple consultations among leadership and clinical staff were conducted to discuss the applicability of the PAD guideline in daily practice to ensure adequate representation and to allocate realistic resource contribution to the implementation of the project (Hodges & Videto, 2011).

Gandhi et al. (2011) emphasized the identification of risk factors and development of comprehensive strategy as an effective way of decreasing cardiovascular risk, improving function, limb outcomes, and quality of life in the management of lower extremity symptoms. Likewise, Olin et al. (2016) emphasized that the confluence of effective therapies to provide multifactorial management options for PAD have impact on the quality of life. The guideline supported these concepts by helping identify the presence of risk factors, appropriate diagnostic options, medical and interventional therapies, referrals, and follow up.

The pattern of use between the components identified in the PAD guideline and the sequence of use of the components at the preimplementation of the PAD guideline indicates a poorly organized order (Figure 2). Specific information could only be obtained in different areas of the patient medical record. There was inconsistency in the assessment of the components and method of practice. The graphical presentation indicated in Figure 2 is a simple linear regression to illustrate the relationship between the components of the PAD guideline and the sequence of use of the PAD components. The graph statistically shows what happened when the PAD guideline was not in place. The absence of the PAD guideline and failure to appropriately follow the sequence of the

critical components of the guideline produced a wide variation in practice, as shown by the widely dispersed values displayed Figure 2.

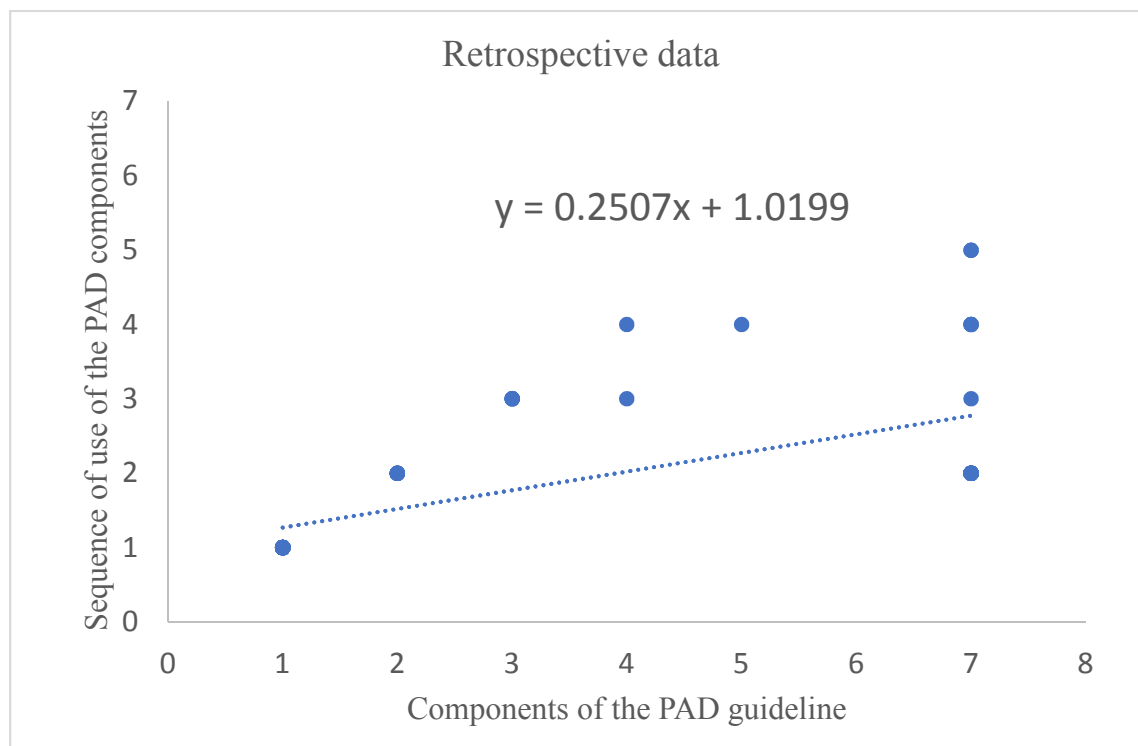


Figure 2. Retrospective data prior to PAD implementation

Objective 2: Develops the guideline into a practice protocol and PAD order set for use in the cardiology department.

The second objective referred to the translation of the practice protocol into a simplified order based on recommended practice. The practice protocol and order set the communication channel by which change was communicated to the staff. Prior to the implementation of the PAD guideline, identification of PAD patients in the cardiology department were obtained primarily from patient complaints and/or referrals from other providers. With the postimplementation group, clinicians used the guideline to identify

patients at risk of developing PAD by following the sequence of the components provided in the guideline.

The importance of this second objective can be confirmed by Slovit et al. (2014), who demonstrated the gap between use of guidelines and practice by examining compliance with the ACCF/AHA PAD guidelines in the management of patients following lower extremity revascularization. The administration of the guideline in daily outpatient encounters in the form of a practice protocol and subsequent translation of the protocol into an order set for use in the cardiology department facilitated and strengthened compliance with the use of the guideline, thereby promoting quality of care, and positive patient outcomes.

In comparison, analysis of the prospective data showed a significant change when the guideline was consistently used in practice (Figure 3). The appropriate use of the guideline during postimplementation displayed a remarkable difference, indicating the value of the implementation of the DNP project. Data as displayed in a scatter plot in Figure 3 assumes linearity, where the scatter plots follow the line, thus indicating a stronger correlation with the use of the guideline and actual practice.

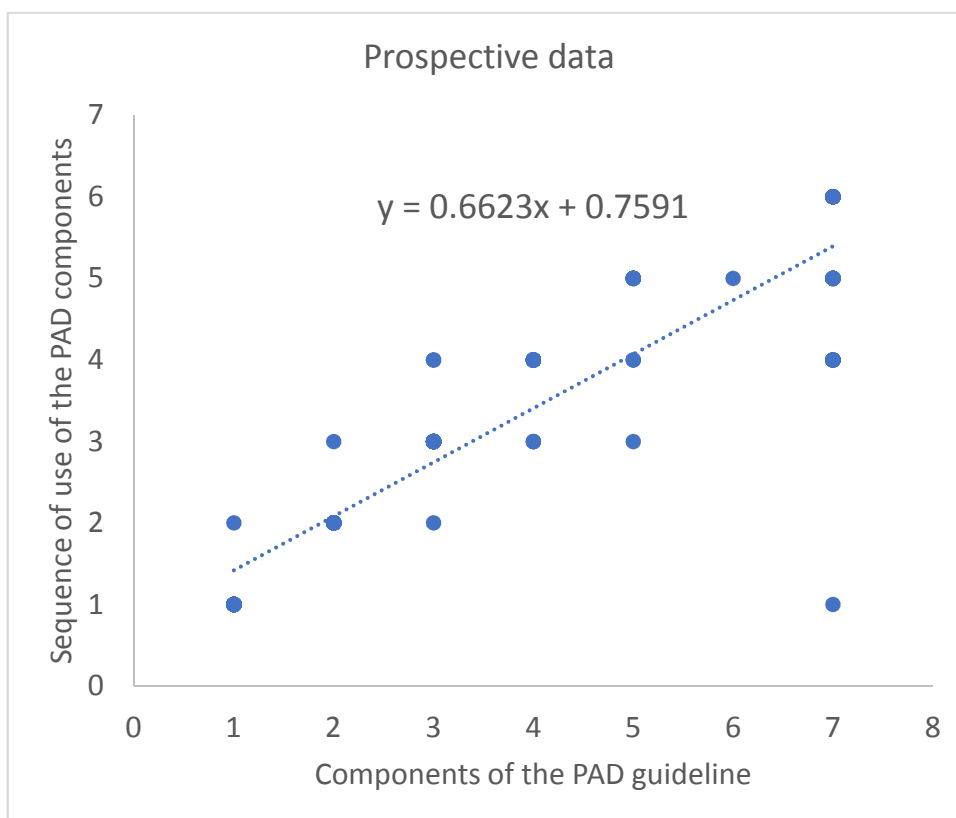


Figure 3. Prospective data following the implementation of the PAD guideline

Objective 3: Introduces the tool to the nurses, nurse practitioners, and physicians.

The third objective pertained to the introduction of the PAD guideline to the nurses, nurse practitioners, and physicians. To enhance the implementation, several meetings were conducted with the department leaders, providers, and staff to develop formal relationships as these are the key stakeholders within the health care system who play a huge role in the uptake of the innovation (Shekelle et al., 2012). The introduction of the PAD guideline was also preemptively discussed among leaders, providers, and staff to explore potential barriers, identify clinically understood terminologies for use in

the order set, identify appropriate channels for any change in the guideline, identify educational needs pertaining to the guideline, and obtain permission to gather data following the introduction of the tool (see Shekelle et al., 2012). The staff received information on the effective use of the guideline and order set during weekly staff meetings. The protocol was explained and discussed initially. The order set was also presented as the short version of the protocol but encompassing all the components essential to the PAD guideline. Pilot testing the guideline for a week was done to familiarize the staff with its contents and to evaluate it for fit with the practice. Revisions on the order set were completed based on staff suggestions as to ease of use and functionality. For each modification to the order set, an evaluation at the end of each week following the change was conducted to evaluate staff response and determine need for further changes. It was at this critical stage that the innovation was implemented and allowed time for integration in the staff practice while allowing the multiple factors such as relative advantage, complexity, trialability, and observability (previously discussed in Section 2) to take place and influence the diffusion of innovation. Using the staff in the change process promoted involvement of the social system in facilitating diffusion and compliance to the innovation in the long run.

Objective 4: Establish the consistency of use of the guideline through evaluation on the rate of patient screening by at least 85%.

The fourth objective was to establish the consistency of use of the guideline through evaluation on the rate of patient screening by at least 85%. After the introduction of the PAD guideline, the staff were given 3 months to integrate the tool in daily clinical

practice and were encouraged to use the order set in every patient encounter in the cardiology office. Compliance of the guideline is an indicator of consistency in the provision of standardized care in the management of patients with PAD and is considered crucial in defining the success of the project. Independent samples *t* test was used to compare the clinical practice/the handling process of each of the cases to the baseline to know whether the guideline was followed or not. A *p* value less than 0.05 was used to establish a difference in the handling process of each of the cases as compared to the baseline. The comparative descriptive statistics on retrospective and prospective compliance scores for the retrospective medical records reviewed ($n=30$) and for the prospective medical records reviewed ($n=30$) are shown in Table 1. There was a statistically significant ($p < 0.05$) increase in the compliance with PAD guideline for the management of patients when the pre-implementation statistics is compared to the post implementation data.

Table 1

Comparative descriptive statistics on retrospective and prospective compliance scores

	Minimum	Maximum	Mean	Standard Deviation (SD)	<i>t</i>	95% CI
Pre	0.167	0.660	0.253	0.163	-8.140	0.186, 0.319
Post	0.118	0.857	0.653	0.187		0.586, 0.720

The improvements of the compliance following the implementation of the PAD guideline is evident from the data shown in Table 2. The number of the reviewed records

showing compliance prior to the implementation of the PAD guideline was three out of 30, while the number of the reviewed records showing compliance after the implementation of the PAD guideline is 23 out of 30. The data shows that the implementation of the PAD guideline resulted in the increase in compliance from 10% to 76.7%. Although the compliance after the implementation of the PAD guideline did not reach 85% as targeted for, the increase from 10% to 76.7% is approximately eight-fold increase in the compliance and is statistically significant ($p < 0.05$). These results show that the project has made a positive impact and has helped improved the compliance with the PAD guideline for the management of patients. The outcome of this DNP project closes the gap between adoption of a guideline and its compliance on the use of evidence in daily clinical practice.

Table 2

Improvements in the compliance following the implementation of the PAD guideline

Sample	Number of reviewed records showing		Percentage
	<u>Compliance</u>	<u>Non-compliance</u>	Compliance
N = 30			
Retrospective Data	3	27	10%
Prospective Data	23	7	75.7%

Implications

Policy

The adoption of the PAD clinical practice guideline is an essential effort to improve healthcare by emphasizing the burden of the disease through provision of clinical services and preventive interventions to the high-risk population and promoting public good by offering health care services that is efficient and cost-effective (Woolf et al., 1999; Woolf et al., 2012). The use of evidence-based practice expressed in the PAD guideline did not only influence the clinical staff but also impacts microsystems, system leaders, and policy makers in recognizing value and transparency based on how evidence is utilized in practice and how credible the content is based on the outcomes it presents (Bodenheimer & Grumbach, 2016; Shiffman et al., 2012; Stevens, 2013). The purpose of the DNP project sought to establish a standard of care that is effective, quality-based, reportable, and outcome based that is consistent throughout the entire clinical practice. Utilizing the most current evidence available and linking it into an analytic framework such as the use of Roger's theory of Diffusions of Innovations provides a strong institutional policy that does not only provide a road map to practice but also one that engages the patient and their family in the decision making, advocates shared decision-making among health care professionals, and one that is adaptable and relevant to patients and families, clinicians, and the health system.

Practice

The adoption of the PAD guideline sought to improve the clinicians' practice approach on the management of PAD following the implementation of the guideline. The

emphasis of the project is not solely focused on the presence of the guideline but to ensure that the PAD guideline is being followed in daily patient encounters in the outpatient setting (Berg et al., 1997). A major benefit of adopting and complying the PAD guideline is primarily to improve the quality of care that patients receive. High-quality care actions are defined as cost-effective and cost-saving measures (Berg et al., 1997). Kredo et al. (2016) equally emphasized that the implementation of clinical practice guidelines facilitates changes in clinicians' behavior by eliminating ineffective measures, costly, or harmful interventions. The use of Roger's theory of diffusions of innovations facilitated effective change implementation in the planning, executing, and evaluating the impact of the PAD clinical practice guideline by instituting causal relationships between theoretical concepts and the effects of aspects of implementation (Kredo et al., 2016).

Research

The DNP project drew attention to the scientific support that highlights the most important outcomes, the effectiveness of a clinical practice using the guideline itself (Woolf et al., 2012). It is essential to support the evidence that suggests that the adoption of the PAD guideline makes a difference in the clinical workflow. The implementation of the DNP project in the cardiology department is one way to support that evidence by replicating similar implementation projects, effect size, and data sufficiency which others have done. As a result, findings will reinforce validity of the outcomes research specifically when it pertains to weighing the risks and benefits of specific interventions associated with the management of PAD. Incorporating even the economic

considerations brought about by adopting the PAD guideline is contributory to the common outcomes across studies during evaluation (Woolf et al., 2012). There is a continuous need for assessing and evaluating the validity of the PAD guideline for the effectivity and improvement of patient care.

Social Change

The adoption of the PAD practice guideline will standardize practice among clinicians in the cardiology department with the use of the most current evidence in the routine care of the population diagnosed with PAD (Woolf et al., 1999). In consequence, it will significantly decrease the risks of PAD patients from developing cardiovascular events and complications associated with PAD (Grenon et al., 2013). The practice of evidence on effective management and surveillance strategies on PAD reduces the catastrophic and costly effects brought about by the disease and its coexisting conditions, decrease mortality and morbidity, improve quality of life, and promote efficient delivery of health care services for this patient population. The consistency of care because of following the PAD guideline will empower patients diagnosed with PAD and their families to actively participate in making decisions regarding their care. Thus, the DNP project promotes the goal of Healthy People 2020 on promoting health, preventing disease and disability, eradicating health disparities, and improving health outcomes (USDHHS, 2017).

Recommendations for Gap-in-Practice

The trend in clinical practice calls for clinical practice guidelines to become imbedded in clinical decision making that is also equally responsive to the requirements

and demands set by health system operations, insurers, and government health spending (Woolf et al., 1999). The result of the DNP project showed that the consistent use of the policy adopted for the care of patients with peripheral artery disease improved quality of care and health outcomes of patients. In addition, the result of the project further recommends that the use of a standardized tool based on evidence such as the peripheral artery disease practice guideline in the management of care and provision of services for this patient population improves consistency of care, and appropriateness of treatment. It will also support quality improvement activities, inform the patients and the community about the quality of care services delivered to the public, and empower patients on healthcare choices based on personal needs and preferences (Woolf et al., 1999).

Strengths and Limitations of the Project

Strengths

The DNP project is the first guideline-directed document that is being followed in the outpatient service of the cardiology department. The emphasis on the components critical to the care and management of the PAD population increased the staff awareness on safety and on the value of consistency of assessment, monitoring, and involvement of multidisciplinary care in the management of the disease. Secondly, the consistency of care provided by the guideline eliminated confusion and facilitated confidence among staff on how to approach the patient diagnosed with PAD without sole dependence on the cardiologist for management of the disease. Thirdly, transparency and standardization for practice as provided in the PAD guideline, became an accountability measure to benchmark quality and performance to inform other clinicians, business and industry

quality leaders, federal funders, and the public on the efforts invested in patient care. Needham et al. (2009) emphasized that quality-control methods are crucial in making sure that the collection, analysis, and reporting of data are accurate (White, 2012). Fourth, the PAD guideline will inform the public consumer in choosing high quality providers based on the uniformity of quality and safety of practice provided to the public. Finally, the DNP project as applied in the cardiology department reflected the AACN's (2006) "scholarship of integration," where knowledge transcends discovery towards improving patient outcomes in PAD care.

Limitations

One of the limitations of this DNP project is that its use is only limited to the cardiology department. Thus, case finding or assessment of high risk patients rely mostly from other providers' clinical assessment without the guide of the essential components embodied in the PAD guideline. Limiting the use of the PAD guideline exclusively within the cardiology department especially in early identification and diagnosis diminishes the goal of a system-wide collaborative effort at early diagnosis and intervention which could prevent complications. Failure to provide early intervention to prevent the development of patient complications defeats the purpose of providing high quality patient care.

Another limitation to the adoption of the PAD guideline is the time frame for which the project was implemented. Effective use of the PAD guideline should also be assessed at six and twelve months following the implementation to determine sustainability of the intervention. Sustainability of the project's effects mean

“institutionalization” which may signify more revisions, electronic medical record integration, or the staff to undergo further training or ongoing technical assistance (Hodges & Videto, 2011). A final limitation of the PAD guideline is that it is not the absolute answer to patient management. It does not guarantee patient safety or specify action for each circumstance. Therefore, health care providers are encouraged to use clinical judgement in dealing with patient care. The patient’s needs are always considered but may not entirely take precedence if the measures identified in the components of the PAD guideline becomes trivial in comparison to costs, outcomes, or quality of life (Woolf et al., 1999).

Recommendations for Future Work

To remedy the limitations presented because of the project implementation, the PAD guideline must be re-evaluated to include a policy that will address clinical assessment and basic diagnostic screening that can be used in primary and other specialty departments within the health system to facilitate early diagnosis and prompt referral to the cardiology department upon identification of high risk patients. Secondly, leaders must assume an active role in ensuring project sustainability or “institutionalization” by updating policy, providing staff training, and encouraging use of quality measures. Lastly, providers and staff must receive continuous training and education on current evidence on PAD to be able to provide high quality care that is optimal and cost effective for the patient, the health system, and the society.

Section 5: Dissemination Plan

Dissemination

The adoption of the PAD practice guideline in the clinical practice within the cardiology department is recognition of the impact of incorporating the best available evidence in the care of PAD patients. The clinical evidence embraced by the PAD guideline in daily patient care must not only be created but also shared and accepted by health care practitioners in guiding decisions and delivering the optimum care for the clientele. The first step in disseminating the results is obtaining the support of the cardiology leadership, providers, and staff. The support of these key stakeholders reflect the utility of practice policy in daily clinical care that will ultimately produce better outcomes that are sustainable.

The DNP project will be primarily disseminated within the health system by collaborating with IT staff to make the policy available through the intranet. Second, to inform the health system of its presence, the new PAD policy will be announced as a screen saver on all the desktops in all of health system's work stations for 2 weeks. Third, the order set that was created out of the policy will be made available through the Cerner health system. Fourth, the new guideline will be presented during the Internal Medicine meeting. Several specialty providers are usually present during this meeting so that the introduction of the new policy can inform providers of a tool that may be used to guide health care practitioners in daily patient encounters. At the external level, the project will be published in ProQuest. The publication will provide a resource for others who are interested in conducting a similar or related project. Finally, the result of the DNP project

will be developed as a manuscript and submitted for consideration for publication by the *Journal of Nurse Practitioners*.

Analysis of Self

As a Scholar

As a scholar, the DNP project is a representation of practice integration where knowledge is being applied to recognize fragmented care and acknowledge the lack of measures within the health system to promote patient outcomes (AACN, 2006). As a scholar, the quality improvement project emphasized the value of bridging the gap between supported evidence by using evidence-based strategies in clinical practice for improvement, quality, and safety of the patients. The development and implementation of the DNP project is an example of knowledge translation geared towards effective and sustainable methods to optimize health care delivery that is financially sound and beneficial to the patients (Brown & Crabtree, 2013). The adoption of the PAD practice guideline demonstrates reflective practice, which applies practice inquiry towards practice change while concurrently integrating the increasing complexity of the clinical environment within the cardiology department to affect a desired change.

As a Practitioner

The adoption and implementation of the PAD guideline helps assert that I am an important stakeholder in the organization, a gatekeeper, a leader, and a decision maker who must be sensitive to the organizational priorities, resources, and needs of the practice environment. The nursing expertise involving collaboration and communication in leading intra- and inter-professional teams are integral in successful practice change and

are essential in team-building skills, contingency planning, and even conflict management (Brown & Crabtree, 2013). The knowledge learned on program evaluations, be it formative or summative, allowed the DNP me to place emphasis on being able to demonstrate efficiency and effectiveness to adjust practice processes to justify continued distribution of resources, reduce costly errors, improve outcomes, and maintain consumer satisfaction (Brown & Crabtree, 2013).

As a Project Developer

The adoption of the PAD guideline pervaded multi-level practice change which involved the administrative level, the providers, nurses, and intra-departmental staff. Thus, implementation of change was complex. It was critical as a project developer that all aspects of the DNP project were defined and outlined to allow coverage from conceptualization through evaluation. The logic model was used as a systematic and visual way to understand the relationships among stakeholders, resources, activities, changes, timelines, and outcomes of the program. The adoption of the PAD guideline was clearly defined, goals were discussed, and objectives were outlined to reach a desired outcome. Timelines were defined into three major elements. These elements were pre-implementation, implementation, and post-implementation. Each element was listed in the logic model so that each timeline is provided with the appropriate attention that was required. Each element was also explored as to the outcomes. With each evaluation, appropriate changes were affected to find the best fit that was unique to the cardiology department.

Student Analysis on the Project's Contribution to Professional Development

The adoption of a PAD guideline for use in the clinical setting was an opportunity to apply work processes to control undesirable practice variations within the DNP-prepared student's work environment. The Institute of Medicine (IOM) defined use of evidence as creating new systems of care delivery that is safe, cost-effective, and quality patient care. The didactic concepts, processes and perceptions applied during the development, implementation, and evaluation of this DNP project helped this student in the deeper understanding about effectiveness and sustainability of practice change (Brown & Crabtree, 2013). In addition, the collaborative aspect and decision making that was essential component during project implementation facilitated this student's refinement of professional oral and written communication skills.

Another contribution of the DNP project to professional development is the realization that there are various aspects of care beyond that of practice expertise and knowledge. As a DNP-prepared leader, equally valued aspects of care also focus on system constraints which limit quality, safety, and cost-effectiveness. Thus, the DNP project is reflective of a practice improvement strategies and outcomes that are necessary to inform practice. Practice inquiry generates knowledge for practice and from practice that may equally benefit other providers and health system who face similar practice problems (Brown & Crabtree, 2013).

Summary

The adoption of the PAD practice guideline is an evidence-based intervention that was focused on improvement of the medical and nursing care of patients with PAD. The

guideline is meant to establish a standard expectation and guide clinicians in the management and care coordination during patient care. The PAD practice guideline is evidence-based and is directed towards closing the gap between research and practice, and improving quality and cost-efficiency in health care. It is also most useful in defining goals and act as a tool against which we can measure the care rendered or received by the PAD population. The dissemination of the result of the project promotes knowledge transfer and obtain support from key stakeholders and target audiences to facilitate uptake in decision making and practice. The project reflects scholarship through knowledge integration, reasserts the practitioner's valuable contribution to clinical practice, and the DNP nurse's ability, as the project developer, to integrate the complexities of organizational change while creating new systems for optimal patient care.

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PRACTICE POLICY AND PROTOCOL FOR THE MANAGEMENT OF PATIENTS WITH LOWER PERIPHERAL ARTERY DISEASE (PAD)

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I. Overview

The practice policy and protocol for lower extremity peripheral artery disease is directed towards the care of patients who are experiencing symptoms of the disease or those who are at risk for developing cardiovascular diseases. The purpose for its development is to describe the practice, improve quality of care, and promote positive patient outcomes using current evidence. The practice protocol will be used in the vascular clinic by nurses, nurse practitioners, physicians, and other allied health personnel as a resource to reduce practice variation within the cardiology department. The content of this policy is intended to encourage healthcare practitioners to comply with the national practice recommendations and in accordance with the Health System mission and vision. This policy and procedure statement does not guarantee patient safety and does not specify actions for each circumstance. Therefore, health care providers are urged to use their judgment, as appropriate, in making patient decisions.

II. Scope of the PAD protocol

The PAD protocol will provide health care practitioners guidance as to the direction of care, diagnosis, and management of patients with lower extremity PAD. It further includes diseases of the aorto-iliac, femoro-popliteal, and infra-popliteal arterial branches.

III. Clinical Assessment for PAD

- **History and Risk-factor Checklist**

Assess for the presence of the following risk factors:

- Smoking- Smoking cessation is a very important component of care for patients with PAD.
 - Current Smoker (___ pack/day for ___ years)
 - Smoking Cessation Interventions
 - ✓ Behavior Modification Therapy
 - ✓ Nicotine replacement therapy: bupropion or varenicline
(Refer back to Primary Care Provider)
 - ✓ Counseling
- Presence of Diabetes
 - Unknown (obtain hemoglobin A1C)
 - No
 - Yes
 - ✓ Assess hemoglobin A1c trends (<7% per The American Diabetes Association (ADA) recommendation)
 - ✓ Proper foot care
 - Use of appropriate footwear
 - Regular podiatry foot and nail care
 - Daily foot inspection
 - Skin cleansing and use of moisturizing creams
 - Skin lesions and ulcerations
 - ✓ ≥ 50 years old has to be screened for PAD (ADA recommendation)
- High Cholesterol

- History of Heart Attack or Stroke
- High Blood Pressure
- Age over 40
- Review of symptoms
 - Claudication
 - pain in the leg muscles, buttocks, thigh, or calf with walking or climbing stairs
 - fatigue in the leg muscles, buttocks, thigh, or calf with walking or climbing stairs
 - pain in the legs and/or feet that disturbs sleep
 - other non-joint related limb symptoms (atypical leg symptoms)
- Physical Examination
 - Inspection of the legs and feet for:
 - Pulses: by palpation or use of Doppler
 - ✓ Characterize as absent (0), diminished (1), normal (2), or bounding (3)
 - Temperature: cool or cold to touch compared to the other leg
 - BP (both arms to r/o subclavian artery stenosis)
 - Auscultation for femoral bruits

IV. Diagnostic Testing

- Resting Ankle Brachial Index (ABI) with pulse volume recording (PVR)
- Exercise treadmill ABI testing
- Toe brachial index for non-compressible arteries (ABI >1.40)
- Arterial ultrasound

- CT angiography of the aorta and bilateral lower extremity runoff
- MRA of the aorta and lower extremity

V. Management after a confirmed diagnosis of PAD

- Medical Therapy
 - Discuss smoking cessation at every clinic visit. Offer pharmacotherapy (varenicline, bupropion, and/or nicotine replacement therapy) and/or referral to smoking cessation program.
 - Antiplatelet therapy
 - Aspirin 81 mg PO daily, and/or
 - ✓ Class Ia indication for symptomatic PAD
 - ✓ Class IIa indication for asymptomatic PAD with ABI <0.90
 - ✓ Class IIb indication for asymptomatic PAD with ABI <0.90-0.99
 - Clopidogrel (Plavix) 75 mg PO daily
 - High-intensity statin agents with emphasis on lowering low-density lipoprotein (LDL) level.
 - The use of statin is associated with the reduction of amputation, reduction of claudication, development of new critical limb ischemia, and new revascularization.
 - Cilostazol (phosphodiesterase type 3 inhibitor) causes vasodilation and inhibits platelet aggregation. It is an effective treatment for claudication. Side effects include headache, diarrhea, dizziness, and palpitations.
 - Treatment of hypertension is essential to reduce the risk of myocardial infarction (MI), stroke, heart failure, and cardiovascular death.

- Use of ACEI or ARB is effective for reduction of cardiovascular ischemic events
 - Beta blockers are also safe to use.
- Control of Diabetes
- Structured Exercise Therapy
 - Initial treatment for claudication (even before possible revascularization)
 - Supervised Exercise Program in a hospital or outpatient facility (Class Ia) for 30-45 minutes at least three times per week for a minimum of 12 weeks.
 - Structured community- or home based exercise program (Class IIa) is self-directed with guidance of healthcare providers.
- Minimizing Tissue Loss in patients with PAD includes intense education on:
 - Prevention of wounds
 - Foot examination
 - Biannual examination of the foot for those with comorbidity of diabetes (Class IIa)
 - Foot infections (watch for local pain or tenderness, redness, edema, indurations, discharges, visibility of bones, fever, tachycardia, elevated or subnormal white blood count, or elevated bands).
 - Referral to interdisciplinary care team (Infectious Disease, Podiatry, Wound Care, ect.) (Class IIa).
- Revascularization for Claudication is intended to improve claudication symptoms, functional status, and quality of life. Factors to consider include:
 - Complaints of functional impairment by the patient
 - Adequacy of response to medical and structured therapy exercise

- Status of comorbid conditions
- Risk-benefit ratio
 - Endovascular Revascularization on hemodynamically significant stenosis of >75%
 - ✓ Angioplasty (balloon dilatation)
 - ✓ Stents
 - ✓ Atherectomy
 - Surgical Revascularization is an effective treatment for claudication and is proven to improve quality of life. The decision to pursue this option must be mutually determined by the patient and the provider on the basis of symptom severity, comorbid conditions, and appropriate guideline-directed medical therapy (GDMT) risk evaluation. Femoral-popliteal bypass is the most common surgical procedure. Use of an autogenous vein is recommended (Class Ia) versus prosthetic graft.

- Management of Critical Limb Ischemia (CLI)

Considerations for this condition include revascularization and wound healing therapies. The goals are to minimize tissue loss, allow for wound healing, and preserve foot function. Medical therapy concomitant with revascularization and wound healing therapies is important to prevent cardiovascular ischemic events.

- Revascularization for CLI
 - Goal: The goal is to provide blood flow to the foot by at least one patent artery to improve pain symptom and promote wound healing.
 - Obtain interdisciplinary evaluation prior to any decision for amputation (Class I recommendation).

- Wound Healing Therapies
 - ✓ Establish a comprehensive treatment plan to achieve complete wound healing.
 - ✓ Maintain close coordination within multidisciplinary team.
- Management of Acute Limb Ischemia (ALI)
 - Clinical Presentations
 - Immediate evaluation by the interventional cardiologist for assessment of limb viability and appropriate therapy (Class I).
 - Suspected cases of ALI do not require imaging (Class I).
 - Medical Therapy
 - Intravenous heparin infusion if not contraindicated.
 - Use of argatroban infusion for those with heparin allergy.
 - Revascularization
 - Intervention for marginal or immediate threatened limbs must be within six hours.
 - Viable limbs can be performed on an urgent base
 - The revascularization strategy may be catheter-induced thrombolysis to surgical thromboembolectomy.
 - Prolonged ischemia (>6-8 hours) are unlikely candidate for limb salvage with revascularization.
 - Diagnostic Evaluation
 - Thrombotic (hypercoagulable state)
 - Embolic (cardiovascular cause).

- ✓ Consider an EKG to rule out atrial fibrillation or MI. An echocardiogram may determine cause for thromboembolism, valvular vegetation, left atrial/ventricular thrombus, or intracardiac shunt.

VI. Follow up Monitoring

- Periodic clinical office evaluations, assessment of cardiovascular risk factors every office visit, limb symptoms, and functional status determined by providers every _____ months (Class I).
- Periodic ABI measurement for those who underwent lower extremity endovascular or surgical revascularization six months after initial intervention then yearly thereafter (Class I).
- Routine duplex ultrasound for infrainguinal, autogenous vein bypass, and after endovascular procedures every _____ months (Class IIa).

Approved/adopted on:

Approved by:

Reviewed on (every 5years):

Revised on:

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Appendix B: Pretest Group

Pretest Group	Component (1)	Component (2)	Component (3)	Component (4)	Component (5)	Component (6)	Component (7)
Subject Number (S/No)	Clinical Assessment	Diagnostic Testing	Medical Therapy	Structured Exercise Therapy	Revascularization	Management of Complications	Follow Up
Pre01							
Pre02							
Pre03							
Pre04							
Pre05							
Pre06							
Pre07							
Pre08							
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Pre26							
Pre27							
Pre28							
Pre29							
Pre30							