2024

Medical Assistants Competency Based Training Program on the Proper Blood Pressure Measurement Techniques: A Quality Improvement Project

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Medical Assistants Competency Based Training Program on the Proper Blood Pressure Measurement Techniques: A Quality Improvement Project

A Scholarly Project Presented to the Faculty of the
Nicole Wertheim College of Nursing and Health Sciences

Florida International University

In partial fulfillment of the requirements
For the Degree of Doctor of Nursing Practice

By

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Approval Acknowledged: DocuSigned by: _____, DNP Program Director
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Date: 4/12/2024

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Abstract

Blood pressure measurement precision is crucial in primary care settings since it is employed in screening, diagnosing, and managing patients with hypertension and other cardiovascular diseases. As global trends and sedentary lifestyles that impact abnormal blood pressure continue to progress, there has been an increase in inaccuracies of blood pressure measurement techniques. Literature highlights the scarcity of guidance and retraining on appropriate blood pressure measurement techniques as the core issue. The primary objective of this project was to explore the impact of an educational program focused on proper blood pressure measurement techniques for medical assistants on improving the accuracy of blood pressure readings within six weeks.

The study used medical assistants from primary care medical centers in Miami to conduct educational interventions to improve their comprehension and knowledge of blood pressure measurement accuracy. The participants were recruited in person and through email. The data was collected through pre- and post-surveys utilizing Qualtrics. After the educational intervention, the participants completed post-questionnaires on up-to-date techniques for measuring blood pressure, various tools for assessing blood pressure, and interpretation of abnormal blood pressure values.

The analysis of the results indicated the success of the competency-based training initiative. This project is significant because it supports the concept that skill-based education can reduce inaccuracies in blood pressure measurements, thereby preventing cardiovascular disease.

Keywords: Blood pressure measurement, training, and medical assistants

Introduction

High blood pressure is the leading cause of premature death and disability, affecting 1.4 billion adults worldwide (Hayer et al., 2022). Proper monitoring, screening, and diagnosis of blood pressure are vital to prevent healthcare delivery complications and ensure positive health outcomes. High blood pressure is a significant problem resulting in cardiovascular diseases. It is estimated from a study that hypertension-related cardiovascular disease accounts for 79,000 deaths each year (Shaikh et al., 2020). Moreover, by 2035, nearly $220 billion will be the total direct cost due to high blood pressure (Shaikh et al., 2020). With such high prevalence and harm to the healthcare system, efforts are being made globally to improve healthcare practices to enhance patients' quality of care and health outcomes. Monitoring blood pressure has been recognized as one of the common assessments in today's clinical practices (Hayer et al., 2022). This is because its measurement is a guide to many chronic diseases and health problems. Blood pressure can either be elevated, termed hypertension when maintained over a long period (chronic), or it can be chronically too low, known as hypotension. This project's immersion site aims to enhance the health and wellness of the population. It aims to serve all populations regardless of their ethnic and cultural background. Adequate blood pressure measurement techniques must be endorsed to develop a culture of wellness and improved health outcomes.

Medical assistants are a fundamental part of the healthcare industry. They comprise approximately 4.5% of the healthcare workforce and are one of the fastest-growing healthcare professions in the United States, with more than 725,000 jobs in 2019 (Rokicki-Parashar et al., 2021). When these medical assistants are appropriately trained, they become a fundamental part of the healthcare team, and their contributions significantly impact enhancing patients' care performance and outcomes.

Background

Proper management and adherence to appropriate blood pressure measurement techniques are vital in controlling blood pressure levels and preventing complications. Because medical assistants are integral to the healthcare organization, focused educational and training programs for enhancing healthcare delivery are necessary. One major consideration is establishing a unified blood pressure training program for medical assistants due to discrepancies in length and quality of training programs. Also, global changes and revolutionization do not limit the education and knowledge acquired but require lifelong learning approaches for education and training. Hayer et al. (2022) reported that blood pressure training requires re-training every 6 to 12 months to maintain skills. The lack of proficient skills in measuring and understanding blood pressure readings often results in unwanted recurrent measurements, healing inertia, and extra consumption of time and resources (Hayer et al., 2022). The competency and knowledge of medical assistants differ because of the variation in the duration of educational programs. Medical assistant degree or certification programs generally cost around $1,200 - $10,000 and are available online and in vocational schools and community colleges (Thomas, 2020). Public, 2-year institutions most commonly offer medical assistant programs (DataUSA, 2021). The relatively short duration and variance in the quality of programs contributes to the problem of inadequate blood pressure measurement training of medical assistants. Further, some states require medical assistant licensing, while others, such as Florida, do not. However, medical assistants may get certification through the American Association of Medical Assistants (Florida Board of Nursing, n.d.). Like other training programs, a blood pressure training program would enhance the quality of care and improve care delivery. Medical assistants measure blood pressure in most clinical settings, but their measurements are not

considered reliable because of the low perception of medical assistant skills and knowledge (Thomas, 2020). The knowledge acquired by medical assistants is limited and depletes over time; therefore, supervised training programs are needed for long-term understanding and competency of knowledge regarding blood pressure measurement (Thomas, 2020).

Documentation and blood pressure recording enable the medical assistants to identify patients' baseline values. The American Heart Association (2020) offers some common tips and guidelines, which are divided into three portions: before, during, and after blood pressure monitoring. It is recommended that patients stop smoking, limit their caffeine intake, exercise for 30 minutes, and sit still for 5 minutes before the procedure (American Heart Association, 2020). During the measurement, it is recommended that the correct size cuff and arm be placed on a flat surface, and the individual should not talk. After the procedure, waiting 1 minute to take another reading is recommended. A minimum of two blood pressure readings is ideal (American Heart Association, 2020). Medical assistants must be educated with this knowledge and competent in delivering knowledge and guidance to new medical assistants. Training programs are necessary to direct medical assistants on managing unknown conditions, such as out-of-range blood pressure. Prompt adherence to unexpected conditions can improve the quality of care. This study investigates the problem of understanding the importance of competency-based training programs for measuring blood pressure and guiding new medical assistants with refresher workshops.

Purpose and PICO Question

The rationale for the study is to test the effectiveness of the educational intervention at improving the accuracy of blood pressure measurement. Its degree of effectiveness will be used to improve the intervention further and to present it to stakeholders as a means to improve the

accuracy of blood pressure measurement among medical assistants in the selected and similar clinics.

This study sought to answer the following PICO question:

"Will a focused educational program on proper blood pressure measurement techniques for medical assistants improve the accuracy of blood pressure measurements over 6 weeks?"

- **Population =** Medical assistants in a medical office
- **Intervention =** Education intervention
- **Comparison =** None
- **Outcome =** Enhanced understanding and knowledge of the accuracy of blood pressure measurement

Problem Statement

The changes in global trends regarding nutrition and the influx of sedentary lifestyles have increased blood pressure levels, resulting in many health issues. Blood pressure is the primary problem and a pathway to other chronic conditions. Individuals at risk of increased blood pressure include those who are overweight, consume excessive amounts of salty food, lack physical activity, are of advanced age, have disturbed sleeping patterns, and consume too much caffeine. Furthermore, it has been noticed that sedentarism is identified as the most concerning modifiable risk factor for hypertension (Ruberti et al., 2021). The rise in the aging population has increased the global prevalence of blood pressure, resulting in increased mortality and morbidity rates. Elevated blood pressure levels can cause premature death and disability due to the impact on the cardiovascular system, encompassing stroke and myocardial infarction. The measurement of blood pressure involves two readings, systolic and diastolic. The educational training program for blood pressure measurement should cover the procedures for taking readings and include

information on lifestyle modifications, such as weight management and exercise, to help individuals manage their blood pressure effectively.

Problem Identification

Blood pressure can fluctuate significantly and may be affected by various activities and lifestyle factors. Healthcare practitioners should be aware of these factors that can cause changes in blood pressure levels. Monitoring can be done through annual auscultation, automated devices, and invasive monitoring (Rehman et al., 2022). However, there is a lack of adequate knowledge among healthcare practitioners regarding the measurement and monitoring of blood pressure levels. A study by Rehman et al. (2022) highlighted that the most common and significant error in blood pressure measurement is the failure to follow the proper technique.

Lifestyle modifications can sometimes lead to falsely elevated or reduced blood pressure readings. Healthcare practitioners need to have the knowledge to distinguish between false and accurate readings. Additionally, some practitioners may not take the measurement process seriously, which can compromise the quality of care. A significant issue is the increasing number of medical assistants who lack adequate knowledge about blood pressure monitoring. Medical assistants are versatile and crucial resources for healthcare organizations (Fraher et al., 2021). Recently, they have played a significant role in managing chronic health conditions. However, they often have limited knowledge of basic procedures, including blood pressure measurement (Fraher et al., 2021). There is a growing focus on educational programs for blood pressure measurement, targeting both basic training and continuing professional development (Elzeky & Shahine, 2022). Systematic, ongoing training in proper techniques can enhance staff's clinical knowledge and performance (Elzeky & Shahine, 2022). According to the U.S. Bureau of Labor Statistics, as of May 2021, there were 57,210 medical assistants employed in Florida, indicating

a high employment rate (U.S. Bureau of Labor Statistics, 2022). Therefore, educational interventions are necessary to properly train these healthcare practitioners in blood pressure measurement and improve public health.

Scope of the Problem

Hypertension is the leading cause of cardiovascular diseases and mortality across the globe. The global prevalence of increased blood pressure is due to the aging of the population and exposure to unhealthy lifestyles. A study estimated that the global adult population acquiring hypertension was approximately 1.39 billion (Mills et al., 2020). Further, it has been noticed that the prevalence of increased blood pressure is not uniform worldwide. In low-income countries, there is a significant upsurge in the occurrence of hypertension; in high-income countries, the prevalence of hypertension is low. The variation in health equity causes disparities in healthcare delivery, resulting in the rise of the disease. The rise in the low-middle countries suggests the increased burden of hypertension and its related cardiovascular diseases. From the statistics, it has been revealed that between 2000 and 2010, the prevalence of hypertension among adults aged 20 or greater increased by 5.2% (Mills et al., 2020). Elevated blood pressure levels do not merely affect the cardiovascular system but are detrimental to increased risk for chronic kidney disease and end-stage renal disease (Mills et al., 2020). The increased prevalence of hypertension is because of a lack of adequate monitoring and training for measuring blood pressure because these results produced by healthcare providers are sometimes specious and misleading. Hypertension is also termed a silent killer because the symptoms do not appear early. Erroneous blood pressure readings can result in wrong diagnosis and treatment among patients with increased blood pressure levels. Out-of-office blood pressure monitoring is recommended for assessing blood pressure status, especially for the diagnosis of hypertension, but this method

relies upon the patient to correctly use a device and to correctly complete a number of steps without practitioner supervision (Townsend, 2020). Most routine care clinics use a "de facto method" to screen, detect, and regulate hypertension (Hwang et al., 2018). Also, increased patient flow and shortage of nursing staff result in a lack of accurate monitoring and measurement of blood pressure, which contributes to increasing prevalence. According to Hwang et al. (2018), clinicians must possess certain skills to apply their knowledge and have adequate time to measure blood pressure accurately. Therefore, training programs are much needed to alleviate such a high blood pressure prevalence. Untrained medical assistants are reported to be the most contributing factor in the increased prevalence of hypertension, and a large population is affected due to a lack of accurate healthcare delivery practices. As these medical assistants make a large contribution to the healthcare organization, training them is crucial to improving health and quality of care practices. The scope of the problem is to train medical assistants with new and improved knowledge regarding measuring blood pressure and enhancing the quality of life.

Consequences of the Problem

Unmeasured and uncontrolled blood pressure may have devastating effects on the human population and healthcare organizations. It also affects the nursing care profession and impairs trust in healthcare facilities. Inaccurate blood pressure readings harm social, environmental, and economic outcomes. The impact of not training medical assistants may result in increased cardiovascular disease incidents, hospital admissions, reimbursements, decreased life expectancy, and an increase in mortality and morbidity rates. The economic effect of a lack of competency-based training among medical assistants increases healthcare costs and is a substantial healthcare burden. Globally, the incidence of blood pressure costs around $131 to

$198 billion annually (Centers for Disease Control and Prevention (CDC), 2022). In another study, it has been reported that hypertension imposes an absolute burden on the healthcare industry, especially in low-income countries. The American Heart Association projects that, in the United States, the direct cost of hypertension by 2030 will rise to $200 billion while the indirect cost will result in $40 billion (Mills et al., 2020). Social factors such as socioeconomic status, education, occupation, income, and awareness are crucial factors for managing and regulating blood pressure. The social impact of this problem is the growing prevalence and complications in the future. Lack of training and education among medical assistants can affect the therapeutic relationship between the patient and provider, making it a significant social consideration for the healthcare organization. Insufficient knowledge and education among medical assistants can cause complications in providing care. In many healthcare clinics, medical assistants possess minimal knowledge in treating patients with abnormal blood pressure values. This may cause a delay in the treatment and involve ethical considerations of the healthcare profession. The dearth of interprofessional collaboration is noticeable among the medical assistants, which affects adhering to the correct procedure for measuring blood pressure and appropriate documentation.

Moreover, training and educating medical assistants on the updated evidence-based practice guidelines will boost their confidence and feelings of self-efficacy, empower them, and encourage them to value their recording and monitoring (Ukomadu, 2019). Medical assistants can play many roles in healthcare organizations. They can be patient educators, coaches, and counselors who guide patients in managing blood pressure, but a lack of competent training hinders their care practice. A study suggests that these medical assistants need foundational

educational programs and continuing education programs to support quality improvement projects (Fraher et al., 2021).

Knowledge Gaps

Globally, efforts are being made to expand the health and wellness of the population. Blood pressure measurement is one of the most concerning healthcare topics, and it has gained focus from clinicians and researchers (Reboussin et al., 2017). This is because it is common among all populations and individuals of certain ages and ethnicities. According to a study, many clinical trials have been used to assess blood pressure, and the protocol is to reduce systematic errors and variability (Muntner et al., 2019). Clinical trials usually differ from each other and are often not published. Correspondingly, it is known from the studies that there is an increase in blood pressure unpredictability if certain guidelines or protocols are followed. The gap in the knowledge is the different ways of measuring blood pressure that affect the understanding perceived by the medical assistants. They fail to deliver precision in measuring and monitoring blood pressure. Secondly, the gap in the knowledge perceived by the medical assistants is because of the various tools and measurement apparatus, including automated office blood pressure monitoring and auscultatory blood pressure monitoring in clinical practice. Hence, their calibrations are quite different, resulting in incorrect measurement and readings because medical assistants lacked adequate knowledge. It is common practice that healthcare workers usually deflate rapidly, resulting in falsely reduced blood pressure readings (Boonyasai, 2022). This is because of a lack of competency-based training. The knowledge gap among medical assistants is the lack of curriculum to address and guide medical assistants toward improved outcomes (Hayer et al., 2022).

Proposed Solution

As the prevalence of blood pressure-related diseases heightens, there is an increased need to develop solutions to implement and improve the health and wellness of the population. The rise in sedentary lifestyles, lack of physical activity, and increased high fat-diet and high-calorie uptake affect the population's health. Hypertension is elevated due to these factors, as they have a detrimental impact on human health. Timely and accurate measuring of blood pressure is important so that adequate medications and cost-effective treatment are rendered to patients, reducing such incidents. In this, the knowledge and proficiency of the medical assistants play an immense role. They are assigned to measure and monitor patients' vitals, including blood pressure measurements (Icenhower, 2022). These medical assistants serve as a liaison between the patient and the healthcare practitioner (Icenhower, 2022). However, these medical assistants sometimes report incorrect readings or inadequately measure blood pressure due to their incapability. The proposed solution to this problem is the implementation of training programs to heighten the knowledge of healthcare practitioners and widen their scope of practice. Interventions that educate medical assistants on American Heart Association (AHA) guidelines (Muntner et al., 2019) and blood pressure measurements at the office can train medical assistants to read blood pressure accurately. A sphygmomanometer is the gold standard for measuring blood pressure at an office or screening setting. The reading should be done at least three times via automated office blood pressure (AOBP) (Asayama et al., 2021). Implementing six-step guidelines endorsed by the American Heart Association (AHA) (Muntner et al., 2019) would endorse a culture of accurately measuring blood pressure and improving the health and wellness of patients at this healthcare facility. Poster presentations and face-to-face training effectively

train and educate medical assistants in measuring blood pressure levels for better productivity and increased health outcomes.

Summary of the Literature

Medical assistants are a substantial part of the healthcare organization. They perform various procedures to improve the population's health, and one common and considerable procedure they perform is measuring blood pressure. It is noted that medical assistants' skills and proficiency in taking blood pressure readings decline overtime, which affects care quality and performance. Blood pressure measurement is one of the most vital procedures that guides and enables the identification of critical conditions such as hypertension. Medical assistants are a cost-controlling resource of the healthcare organization, and they have the responsibility of supporting a wide range of disparate healthcare roles in serving the patient population. Due to variations in global trends and the increase in healthcare disparities, medical assistants have emerging roles and responsibilities in clinical practices. According to a study by Rokicki-Parashar et al. (2021), medical assistants are indispensable members of the healthcare team, assisting patients and clinicians. In the United States, medical assisting was a critically growing field in 2019, with more than 725,000 postings (Rokicki-Parashar et al., 2021).

A gap in the accurate blood pressure measurement can result in both over and under-treatment of hypertension and may subsidize suboptimal control. Quality improvement and sustainable implementation of guidelines endorsed by the American Heart Association (AHA) are needed to overcome the decline of knowledge and accuracy when performing blood pressure measurement and reading (Rokicki-Parashar et al., 2021). Medical assistants must be trained to measure blood pressure readings and precisely advance their knowledge and skills. Competency-based training programs for blood pressure measurement among medical assistants

in primary care medical centers are necessary to prevent repeated measurement, unwanted use of resources and time, or therapeutic inertia (Hayer et al., 2022). Another study by Hayer et al. (2022) also discussed the importance of addressing the curricula gap in measuring blood pressure. Medical assistants' knowledge was tested after the eLearning module, and significant improvement was noticeable (Hayer et al, 2022). As hypertension has a devastating effect on the population, false readings can lead to mishaps in the care procedure and treatment. Educational programs effectively and efficiently enlighten knowledge and performance and reduce errors in measuring blood pressure. Educational programs using other virtual platforms have shown constructive outcomes in elevating knowledge and precision in measuring blood pressure (Elzeky & Shahine, 2022).

Measurement of blood pressure requires appropriate use of equipment and technologies. Also, the correct placement of the hand and cuff is vital in preventing false readings. Lifestyle modifications have a significant impact on the measurement of blood pressure. Faulty equipment can also result in incorrect readings, affecting the patient's health status and challenging the medical assistants' competency. Blood pressure measurement requires equipment mounted on rolling stands that alleviate complications for the medical assistants to measure blood pressure. When there is an increased influx of patients, delays in measuring blood pressure and adherence to prompt treatment may be possible. Limited staff impairs adequate practice protocols and affects blood pressure measurement. In a complex environment, the patient sometimes feels stressed and hectic during the process of measurement, which affects the reading. The clinical layout and patient volume significantly impact blood pressure measurement (Hwang et al., 2018).

Literature Search Process

This project's literature review was conducted through PubMed Central, MEDLINE (via PubMed) and CINAHL. These databases allow for straightforward searching and the application of filters to retrieve desired results. Moreover, the articles in these databases are constructive and enhance the literature review results. The articles are scholarly and peer-reviewed. Additionally, access is direct and clear because the interface is user friendly. The search terms and Boolean phrases used were “blood pressure measurement”, “medical assistants,” and “training.” Initially, 102 results were obtained, and after filtering for duration, text availability, article type, and publication date were limited to 5 years, 24 results were obtained, of which 10 were found to be relevant. After the search, eight articles met all the criteria designed for this literature review.

Inclusion and Exclusion Criteria

The articles selected for the study are relevant to the topic. These articles were in English and provided evidence-based knowledge regarding blood pressure monitoring. The study population included in these articles were healthcare practitioners, including medical assistants, while in some of the articles, the study was conducted in a medical office corresponding to the clinical practice issue and PICO question. The excluded articles either had irrelevance to the topic, or their study population did not comprise healthcare practitioners such as medical assistants. Also, this literature review excluded articles published more than five years ago and those that lacked an article type that fits this study question. The systemic review of the excluded articles was outdated and does not fit into today’s clinical practice.

Literature Appraisal and Literature Matrix

Education and training of medical assistants are essential in enhancing the quality of life. Medical assistants are the largest and most prominent figures in healthcare facilities. Their roles

and responsibilities must be valued to endorse a culture of wellness and alleviate the burden on the nurse practitioners. The literature matrix table's components include the author's name and publication date, the purpose of the study, study design, sample (setting), data collection measures, results, strengths/limitations, relationship to projects, and level of evidence. It is a comprehensive way to compare the articles and their research. In this study, eight articles are included that highlight the importance of competency-based training for measuring blood pressure among medical assistants in medical facilities.

Characteristics of the Included Studies

Education and training are vital for elevating the health and wellness of the population and adherence to critical knowledge. The change in care practice and the influx of technology demand accurate care delivery with safe, effective, and efficient care. Changes in the healthcare environment are inevitable, and healthcare practitioners must be competent in adhering to such changes to generate productive health outcomes. Blood pressure measurement is the most common clinical procedure, and its correct measurement is a pathway to many acute and chronic conditions, including cardiovascular diseases. An accurate measure of blood pressure safeguards the individual from life-threatening diseases and complications.

The article that corresponds to the clinical question is “Promoting Sustainability in Quality Improvement: An Evaluation of a Web-Based Continuing Education Program in Blood Pressure Measurement “aimed to report on the effectiveness and institutionalization of the virtual educational program to increase knowledge and skills regarding blood pressure measurement among nurses and medical assistants in ambulatory settings (Block et al., 2018). Researchers found that the accuracy of blood pressure measurement is inconstant in office-based settings. Additionally, nurses and medical assistants fail to follow the guidelines endorsed by the

American Heart Association (AHA) (Block et al., 2018), resulting in poor management and regulation of blood pressure and overtreatment of hypertension. The contributing factors are a lack of adherence to supervised training, proficiency, and knowledge of correct technique. Sustainable and adequate training involving comprehensive quality improvement “bundles” are needed to guide and educate medical assistants on inadequate blood pressure monitoring. Virtual training emerged as an effective solution in advancing healthcare practitioners' knowledge and providing precise care approaches. The study was conducted in six primary care practices within the Johns Hopkins Community Physicians (JHCP) health system (Block et al., 2018). The study design included pre-post intervention assessment among the staff of JHCP. The assessment comprises knowledge, behavior, and attitude perceived by the JHCP staff. The training program was delivered online and entailed two 15-minute videos with pre-post module multiple-choice questions. The participants must achieve 80 or re-watch the videos (Block et al., 2018). The study's results revealed that 88 clinical staff completed the education program, out of which 98% of the participants were female and 73% were younger than 46 years, with 52% being in their current job for the past 3 years. The study findings revealed that finishing the training program significantly improved blood pressure recording and reading in the EMR (Block et al., 2018). The limitation of this study was the short follow-up time in evaluating knowledge, skills, and behavior among medical assistants. This study cannot be generalized because it was conducted in specific medical facilities, and knowledge was not maintained among staff (Block et al., 2018). Thus, this was the first published study to address the effectiveness of online-based educational programs, yet more studies need to be conducted for better generalizability. This experimental study is of Level 1 evidence and is a good quality study (LibGuides, 2023).

The study “Using Web- Based Training to Improve the Accuracy of Blood Pressure Measurement Among Health Care Professionals” (Hayer et al., 2022) reported that high blood pressure is the leading variable cause of premature disability and death affecting 1.4 billion adults. Adequate blood pressure measurement is vital for correct screening, diagnosis, and high blood pressure monitoring. If the measurement is taken incorrectly, it may result in poor quality of life. This study aimed to improve blood pressure measurement accuracy among healthcare professionals using virtual training. The study design selected for this study was a randomized control trial. Healthcare practitioners lack significant knowledge regarding appropriate skills for measuring blood pressure. The American Heart Association established a 30-minute e-learning module to enhance current blood pressure knowledge perceived among medical practitioners (Hayer et al., 2022).

The sample size selected for this study included 177 practicing providers, including medical assistants. The participants were chosen at random 1:1 to either the control or intervention group (Hayer et al., 2022). Data were collected through a pre-post assessment approach, and the control group followed the test-retest approach. The initial assessment revealed that participants lacked knowledge, while the e-learning module was beneficial. The results of the findings revealed on average, the intervention group performed 3.4 more skills accurately, contrasting to the control group, which performed 1.4 skills ($p < .01$) (Hayer et al., 2022). The study's conclusion stated that reinforcement of existing evidence is necessary, and recurrent refresher training is advantageous to enhance the precision of blood pressure among all practicing providers. The study's strength is the generalizability among all clinicians, including medical assistants and healthcare settings. The limitation of this study was the evaluation time, which was short for assessing the knowledge and skills of the practitioner. Thus, future research

is needed to interpret the frequency of re-training and evaluation of the knowledge and skills of the practitioners (Hayer et al., 2022). This is an experimental study; hence, it is of Level 1 evidence and the highest quality (LibGuides, 2023).

The article “Redesigning Blood Pressure Measurement Training in Healthcare Schools” (Hayer et al., 2022) manifested this PICO question. According to this article, blood pressure measurement is the most widely practiced clinical procedure. In most settings, it is noticeable that medical school students dwindle in adhering to correct measurement practices, therefore, focused demonstration, and redesigning of plan of study are necessary. This study aimed to highlight the importance of eLearning for blood pressure measurement and to determine accurate measurement skills (Hayer et al., 2022). This is important because the exact blood pressure measurement yields productive health outcomes. This study demonstrates three eLearning modules to enhance medical students' knowledge (Hayer et al., 2022). The initial module is the foundational module, which is framed for students in the early training stage. The second is the SMBP, created for pre-clinical or clinical training after the foundational module. The third is followed by a short refresher module that aims to guide individuals' prior clinical experience.

The study design was a randomized-control pilot study (Hayer et al., 2022). The study population includes first-year medical students and first-year baccalaureate nursing students. The sample size comprises 77 students, with 33 medical students and 44 nursing students (Hayer et al., 2022). The study's results revealed that 72% of the knowledge questions were answered accurately in the pretest, while in the eLearning module, increased to 85% (Hayer et al., 2022). The individuals were trained in the adequate positioning of the hand and the use of the right cuff size. The study findings discovered the essentials of pilot testing as a product to launch the modules for increasing knowledge and training healthcare providers to generate productive

health outcomes. The study's strength is that it highlights the importance of improving curriculum, and eLearning cannot solely assist in increasing knowledge and various skills needed to support this training by health educators (Hayer et al., 2022). The limitation of the study is the study design, which is a pilot study. The second limitation was that students were not beginner learners, affecting the study results. The author intends to share and publicize results for future benefits (Hayer et al., 2022). This is an experimental study; hence, it is of Level 1 evidence and the highest quality (LibGuides, 2023).

The article related to the clinical question is “Barriers to Accurate Blood Pressure Measurement in the Medical Office” (Hwang et al., 2018). This study explored barriers affecting adults' blood pressure measurement in primary care clinics. In the United States, hypertension has affected 29% of adults and is recognized as the leading cause of death and disability globally (Hwang et al., 2018). It has been noticed that the measurement of accurate blood pressure readings is a challenge in primary care clinics. It is crucial to have correct knowledge of blood pressure measurement so that correct guidelines can be applied. This study was conducted among six adult primary care clinics in Texas from 2015-2016 (Hwang et al., 2018). Among the six clinics, one was in central Houston, while the other five were in the greater Houston area. The observation was used to collect data among 54 routine patient encounters in these six clinics. Secondly, interviews were conducted with clinic managers on barriers to proper measurement of blood pressure, measurement devices of blood pressure, and training of clinical staff. The open-ended interview questions lasted nearly 15 to 20 minutes (Hwang et al., 2018). Thirdly, a focus group discussion was held to understand the perspective on the measurement of blood pressure in the clinic. The study's results demonstrated errors in measuring blood pressure among 54 patients. The results revealed the barriers to correctly measuring blood pressure, such as staff

knowledge and behavior, workflow constraints, and equipment issues. The study's conclusion illustrated that accurate blood pressure measurement is affected by numerous factors, and it is challenging to accomplish results in primary care. Therefore, improvement programs are needed to enhance knowledge and clinical practice. The study's strength was the in-depth knowledge and practice attitude of the clinical managers and healthcare staff and the day-to-day behavior observed in the measurement of blood pressure (Hwang et al., 2018). The limitation of the study was this study comprised inclusion from one healthcare system. Also, convenience sampling was used for field observation, which affected the study results. This data collection was done in a single day (Hwang et al., 2018); hence, the results cannot be generalized. This randomized control trial study is of Level 1 evidence, and the quality is good because results cannot be generalized due to the limited study setting (LibGuides, 2023).

Moreover, this clinical question can be defined by the article “Can an automatic oscillometric device replace a mercury sphygmomanometer on blood pressure measurement?” (Park & Park, 2019). This study aims to facilitate scientific evidence to contrast the effectiveness and replacement of a mercury sphygmomanometer with an automated oscillometric device and its application in routine practice (Park & Park, 2019). The study design is a systematic review and meta-analysis. The studies in this article were from Medline, Embase, CINAHL, and the Cochrane Library (Park & Park, 2019) The included studies compare the automated oscillometric devices and mercury sphygmomanometers for measuring blood pressure, and the study characteristics were distant using the evidence-table and random-effects meta-analysis. The participants selected for the study were adults aged 15 or more from both outpatient and inpatient settings and required blood pressure measurement. The results from the various studies were gathered, and 24 studies were selected, encompassing 47,759 subjects (Park & Park, 2019).

The meta-analysis results deduced that automated oscillometric devices had lower accuracy than mercury sphygmomanometers for both systolic and diastolic blood pressure. The conclusion drawn from this study stated that automated oscillometric devices show variations and differences in blood pressure measurement because of the manufacturer and type of product (Park & Park, 2019). The limitation of the study was the lack of carrying out a sub-analysis of the device as various devices were included. Further, the participants included adults over 15 years of age, and in most studies, the mean age was in the 40s and 50s (Park & Park, 2019). The study results cannot be generalized for children, pregnant women, and the elderly population (Park & Park, 2019). Thus, healthcare practitioners should know how to judge correct values and baselines. This is a systematic review with meta-analysis; hence it is of Level 1 evidence, and the quality is good because results cannot be generalized due to the limited study population (LibGuides, 2023).

The study that coincides with this clinical issue is "Effects of an Educational Program Using a Virtual Social Network on Nurses' Knowledge and Performance of Blood Pressure Measurement" (Elzeky & Shahine, 2022). Hypertension has been addressed as a complicated health problem that accounts for approximately 8.5 million deaths annually and affects the health of 1.3 billion individuals (Elzeky & Shahine, 2022). Most of the deaths occur in low- and middle-income countries where the prevalence of hypertension has reached 23% among adults (Elzeky & Shahine, 2022). Proper blood pressure measurement adheres to clinical principles and promotes a wellness culture. This study aimed to assess the effects of an education program on nurses' performance, knowledge, and error range in measuring blood pressure using WhatsApp (Elzeky & Shahine, 2022). It was assumed that nurses who had been enrolled in the WhatsApp educational interventional program possessed enhanced knowledge, performance, and accuracy

in measuring blood pressure compared to those who had not been enrolled. The study design was a parallel, single-blind, randomized controlled trial with a pretest, post-test, and control group (Elzeky & Shahine, 2022). The study was conducted at two hospitals in Mansoura, Egypt, and stratified random sampling was used as a sampling method. The participants included 70 nurses divided into two groups, 35 in control and 35 in interventional (Elzeky & Shahine, 2022). The questionnaire was used as a method for data collection (Elzeky & Shahine, 2022). The interventional group received 24 educational sessions via WhatsApp, while the control group received one educational session via conventional lecture. The results from the study revealed that there were no statistically significant differences in pretest performance, knowledge, and range of error scores in both groups, while in the post-test, the interventional group possessed higher knowledge compared to the control group ($p < 0.001$) (Elzeky & Shahine, 2022). The conclusion drawn from the study reveals that WhatsApp intervention effectively increased nurses' knowledge and eradicated a range of errors. However, a multimodal approach is still needed to heighten the performance scores. The limitation of the study was the short follow-up period for the evaluation of knowledge, reading accuracy, and performance. Secondly, this study included only cardiac nurses; hence, the results cannot be generalized (Elzeky & Shahine, 2022). Also, the technique was poor on the baseline and lacked accuracy and reading during the study. Thus, further studies are needed for accuracy and precision regarding this educational intervention. This study is a randomized controlled trial with Level 1 evidence, and the quality is good because results cannot be generalized due to the limited study population (LibGuides, 2023).

The article that aligns with the PICO statement is “Transforming Interprofessional Roles During Virtual Health Care: The Evolving Role of the Medical Assistant Concerning National

Health Profession Competency Standards" (Rokicki-Parashar et al., 2021). Medical assistants are an integral part of the healthcare organization with varying roles. Initially, the knowledge possessed by medical assistants was partial and was confined to obtaining vital signs and office work. However, due to the advancement and revolutionization of healthcare, medical assistants are foundational to team-based care. They now work together with patients, teams, and systems. During COVID-19, the roles of medical assistants transitioned with increased responsibilities and incorporation into virtual care. According to this study, in the United States, medical assisting is considered one of the fastest-growing occupations, with 725,000 employees in 2019 (Rokicki-Parashar et al., 2021).

This study aimed to understand the impact of transforming interprofessional roles during virtual healthcare in the context of National Professional Competency Standards. The study was conducted at the Stanford Health Care Primary Care and Population Health (PCPH), encompassing coordinated care clinics, senior care clinics, six clinical primary care sites, and four employer-based clinics (Rokicki-Parashar et al., 2021). The data was collected via semi-structured interviews between May 14, 2020, and June 8, 2020, with 24 (22 females and 2 males) medical assistants at 10 primary care sites (Rokicki-Parashar et al., 2021). The data were analyzed using the qualitative analysis technique. The study results revealed three major themes: role expansion, role apprehension, and professionalism. These roles directly impact the expansion of virtual care. The conclusion drawn from this study indicated direct clinical work and expansion of other roles that support quality improvement and technology. The national training program would provide better competencies and train medical assistants to widen their scope of practice on interprofessional teams (Rokicki-Parashar et al., 2021). The study limitation included informants from diversified primary care sites. The interviews were not supervisory,

and the informants were from large west coast academic healthcare. Thus, a failed representation of medical assistants employed at private, community clinics (Rokicki-Parashar et al., 2021). This study was a randomized controlled trial, which is of Level 1 evidence and high quality (LibGuides, 2023).

The article “Improving Blood Pressure Screening and Control at an Academic Health System” (Shaikh et al., 2020) highlights the impact of high blood pressure and its influence on direct healthcare costs. It is estimated that the direct healthcare costs due to hypertension will rise to $220 billion by 2035 (Shaikh et al., 2020). Globally, interventions are being made to address this clinical problem and to implement ways such as training and education to alleviate it. The study aimed to enhance blood pressure screening and control in an academic health system and endorse quality improvement initiatives. The assumption of this study was the improvement and enhancement of the blood pressure screening and control at UC Davis Health with a multifaceted QI intervention. The study occurred at the UC Davis Medical Group with 1500 physicians and employed staff (Shaikh et al., 2020). Data were collected through interviews and was based on the recently endorsed strategies for improving potential in blood pressure measurement (Shaikh et al., 2020). At the UC Davis Health Center, the blood pressure screening and control quality improvement initiative was endorsed from 2016-2018 and resolve systemic design Lean A3 was used (Shaikh et al., 2020). The results of the study revealed significant outcomes on the patient’s part. It documented that blood pressure control increased from 62% to 75%, and those who initially had blood pressure greater than 140/90mm Hg were reduced to less than 140/90mm Hg after a rest period of 5 minutes (Shaikh et al., 2020). The study limitation was implementing the QI initiative at a single healthcare facility. Secondly, the rest period between two consecutive blood pressure readings was challenging for the QI initiative and white coat effect. The study's

conclusion highlights the need for the evolution of clinical guidelines and blood pressure control thresholds and a team-based approach to alter clinical workflows for better adherence (Shaikh et al., 2020). This study is a randomized controlled trial; hence, it is of Level 1 evidence and was of good quality because the results cannot be generalized (LibGuides, 2023).

Definition of Terms

Medical Assistants

Medical assistants are healthcare professionals who assist nurses and doctors in clinics and medical offices. They are responsible for measuring vital signs, height, and weight, and setting up the exam room. They discuss symptoms and health concerns and pass this information further to doctors. The duties of medical assistants vary depending on the clinic or office, and they can be assigned at the front desk or a medical office (Brennan, 2021).

Automated Office Blood Pressure (AOBP)

An oscillometric blood pressure measurement technique uses a blood pressure device capable of taking many blood pressure readings autonomously with precision without the existence of an observer (Muntner et al., 2019).

Self-Measured Blood Pressure (SMBP)

Self-measured blood pressure is a regular blood pressure measurement of a patient outside the clinical setting. This tool facilitates the measurement of blood pressure by the patient at different points in time and allows for convenient measuring of blood pressure and can enhance access to care and quality of care (CDC, 2022a).

Automated Oscillometric Devices

Automated oscillometric blood pressure devices were developed to replace manual auscultatory blood pressure measurement with the sphygmomanometer. These were developed

for improved accuracy using the scientifically accepted validation protocol (Sharman et al., 2022).

Conceptual Underpinning and Theoretical Framework

The theoretical framework utilized in the present study is the Lewin Change Model (Manchester et al., 2014). This model is particularly appropriate because the study and intervention are closely related to a quality improvement project for medical assistants measuring blood pressure. Lewin's construct of unfreezing relates to interrupting habits and behaviors and forms the initial moment of change (Cummings et al., 2016). This intervention applies unfreezing in that it evaluates medical assistant habits and behaviors with respect to measuring blood pressure in the pre-test. Not only does the pre-test allow the primary investigator to ultimately measure the intervention's effectiveness, but it also provides information about habits and behaviors needing improvement and addressing. In this way, it 'unfreezes' practices that have become problematic in achieving accurate blood pressure measurements. The second construct is change. The intervention achieves change through the in-person educational intervention and PowerPoint presentation. These parts of the intervention apply the construct of change because they show the participants that the way they have been accustomed to measuring blood pressure is problematic and not wholly aligned with evidence-based practice. The third construct is refreezing. The intervention applies the construct of refreezing in two ways. First, it asks participants to retake the survey after having undergone the intervention. Within the construct, this has the impact of reinforcing the theory and practice elements of measuring blood pressure that were refined and corrected through the instructional portion of the intervention. Second, refreezing occurs through possible revision of the intervention to become more effective.

Methodology

Blood pressure measurement is substantial in improving quality of life. This quality improvement project sought to establish, implement, and enhance the knowledge and understanding of medical assistants for the correct blood pressure measurement technique in a medical office. The project's goal was to provide educational intervention and training to medical assistants in an ambulatory clinic to understand correct blood pressure measurement and endorse a culture of quality improvement. The immersion site was a non-profit healthcare organization with a full complement of health and wellness services for all-age population. The medical centers operate in a comprehensive suite of healthcare and social services. This facility is considered a trusted partner for patients, health plans, and providers. Proactive and preventive services are rendered that provide easy access to healthcare. This organization offers complete services to meet individualized patient demand, including transportation. The providers at this healthcare organization deliver modern solutions with simplified workflows and transition to a risk-based arrangement. It empowers community partners with novel solutions for ensuing value-based care and collaborative care delivery.

Value-based care includes optimization of outcomes, guaranteeing maximum revenue, and safeguarding the bottom line. This healthcare company provides a unique opportunity for risk-adjusted payment models that focuses on the quality of care rather than the quantity of care provided (CareMax, 2022). In this project, the main organizational target was to train medical assistants with proper blood pressure measurement techniques and to improve the accuracy of blood pressure measurements.

Currently, proper practice techniques for measuring blood pressure are not always fully adopted in the practice of medical assistants (Green et al., 2022). Further, there are few

standardized educational interventions or formal, supervised training to train medical assistants in adherence to these standards and to achieve accuracy in blood pressure measurements (Eyikara & Baykara, 2018). Therefore, this project would guide medical assistants and enhance their knowledge in measuring blood pressure. Providing this education and training to medical assistants in Miami represents a prime opportunity to alleviate disparities in care delivery and support the vision of health improvement outlined by the clinic.

In summary, the main goal of this project was to develop educational and training interventions for medical assistants regarding blood pressure measurement at selected Miami-Dade county primary-care clinics to alleviate the risk of cardiovascular diseases and narrow the treatment gap among the affected population. The sample size selected for this project was 23 medical assistants. This sample is important because it facilitates determining the project's results for generalizability and its impact on future studies.

SMART Objectives

For this DNP quality improvement project, the following SMART objectives were identified:

- Educate medical assistants at selected Miami-Dade County primary care clinics about the proper blood pressure measurement techniques within 4 weeks of starting the quality improvement project.
- Develop and conduct pre- and post-tests to evaluate the impact of education on medical assistants for adhering to awareness and knowledge on precision for blood pressure measurement within 6 weeks duration.
- Increase awareness on the significance of blood pressure measurement among medical assistants at the selected primary-care clinics by 85% at least within 6 weeks duration.

Setting and Participants

The site of the quality improvement project includes ambulatory care facilities located in Miami-Dade County, Florida. These facilities were part of the wider, regional network of primary care facilities. The selected clinics provide primary care services to all populations, including pediatrics, geriatrics, and women's health. The organization employs more than 2000 individuals and works with affiliated providers across ten states. The network comprises 37 clinics in the region that operate from 7:00 a.m. to 5:00 p.m. The area of focus for the study is Miami-Dade County, and participants selected for the study were 23 medical assistants from the selected primary-care centers located in Miami-Dade County.

Procedures

Under the mentorship of the former medical director of the clinics, the primary investigator initiated a quality improvement project to enhance the competencies of medical assistants at the clinics about competencies in blood pressure measurement. To evaluate the knowledge and competency in blood pressure measurement among medical assistants at medical homes, a pre-post intervention design was employed. Initially, the investigator developed an educational presentation to facilitate learning and then designed pre-post surveys.

The educational session provided a comprehensive overview of blood pressure measurement, including the use of various tools for measuring blood pressure, six-step guidelines endorsed by the American Heart Association (AHA), interpretation of abnormal blood pressure values, the importance of selecting the correct cuff size, and proper hand placement (Hayer et al., 2022). Additionally, the presentation introduced participants to different blood pressure measurement tools commonly utilized in various healthcare settings, aiming to significantly improve the medical assistants' ability to recognize different measurement values.

Upon receiving approval for the educational materials and the surveys/questionnaires, these resources were disseminated to the participants via email, ensuring easy access and participation. This structured approach not only facilitated the educational intervention but also ensured a systematic assessment of the impact on the medical assistants' competency and knowledge related to blood pressure measurement.

Participant Recruitment

The participants for this study were recruited in person and through email. The DNP student visited the clinics, and an email was sent to the participants, as it is the most convenient way to incorporate a large population. The participants who responded to the email were recruited for the study, and questionnaires were emailed to them.

Data Collection

Data for the study was collected through Qualtrics. The pre-surveys were used to identify the participants' baseline knowledge, followed by the educational intervention including a PowerPoint presentation. Questionnaires were distributed through Qualtrics. The post-surveys were filled out by the participants after the training intervention, and the scores of the surveys would be compared before and after an intervention to measure the effectiveness of training in influencing the knowledge of medical assistants regarding accurate blood pressure measurement techniques.

Data Analysis

Data were analyzed using a statistical approach, including inferential analysis and paired t-tests. The paired t-tests were carried out with respect to pre-test and post-test results for the group, according to each of five subsections of the survey questions, as well as for the overall results across pre-test and post-test. The data analysis was conducted to satisfy the goals and

objectives of the project, with the primary goal of increasing accuracy of blood pressure measurements at the facility. This has the effect of comparing the responses of the participants under two distinct conditions. Namely, the participant group's ability to accurately take blood pressure measurements before the intervention was inferred through the pre-test, and its ability to do so after undergoing the intervention was inferred through the post-test. The impact of the intervention on the ability of participants to accurately take blood pressure measurements was inferred through the paired t-test, which juxtaposed their inferred ability to do so before and after the intervention. Paired samples were created for pre-test and post-test scores for the participant group for each of five sections of the survey. The effect magnitude and statistical significance were analyzed with the use of Cohen's d in order to determine whether a valid conclusion could be drawn about the effectiveness of the intervention. The data were analyzed to answer the DNP project's PICO question. This inferential analysis was utilized to draw a conclusion about the effectiveness of the intervention in achieving the goal of increasing the accuracy of blood pressure measurements by facility staff. Understanding the level of effectiveness of the intervention allowed the primary investigator and other stakeholders to establish the usefulness of the intervention as well as to make potential changes to improve it further.

Protection of Human Subjects

All medical assistants at the clinics were asked to participate in this study. This study relied on voluntary participation, and there was no penalty for individuals who did not participate in the study. The selected medical assistants were provided with a brief introduction to the project before introducing pre-post surveys/questionnaires. The introduction included a detailed purpose of the study, the steps needed to complete it, and the possible timeframe for the completion of the study. The workers were advised to keep data anonymous and protect the

participants' identities. To protect the confidentiality of the participant, computer-based files were encrypted, documents were stored in a locked file cabinet, and consent was obtained. The Institutional Review Board (IRB) approval was obtained and secured from both the healthcare company and Florida International University.

Data Management

The DNP student and project head managed the data. All data were stored on a password-protected computer to prevent data leaking and breaching of data. The data was disposed of using special software that can make the data unreadable or unrecoverable. The participants' private information was managed by protecting it through a password and keeping their identities anonymous.

SWOT Analysis

Strengths

The high volume of patients in primary care settings provides medical assistants with ample opportunities to practice and refine their blood pressure measurement techniques, ultimately leading to improved accuracy and patient outcomes.

The willingness of medical assistants to learn and actively participate in this quality improvement project was a key factor in its success, as it demonstrated their commitment to enhancing patient care and adhering to best practices in blood pressure measurement.

Weakness

The lack of knowledge and uniformity in blood pressure measurement techniques among medical assistants can lead to inconsistent identification of patients with abnormal high blood pressure readings. This inconsistency can result in missed opportunities for early intervention

and management of hypertension, ultimately affecting patient outcomes and increasing the risk of cardiovascular complications.

Opportunities

To establish a comprehensive blood pressure competency-based training program specifically designed for medical assistants. This project aimed to ensure they are equipped with the proper measuring techniques for accurately measuring blood pressure. By doing so, it is anticipated that this training will lead to positive clinical outcomes, including more precise diagnosis and management of hypertension, ultimately improving patient health, and reducing the risk of cardiovascular complications.

Threats

The lack of uniformity and organization within the healthcare facility can lead to inconsistent workload distribution among medical assistants. This imbalance can result in some medical assistants being overburdened while others may have lighter workloads, affecting the overall efficiency and quality of patient care.

Some medical assistants perceive that they lack sufficient time to complete their daily tasks effectively. This perception can lead to feelings of stress and inadequacy, potentially impacting their job satisfaction and the quality of care they provide to patients.

Analysis of Results

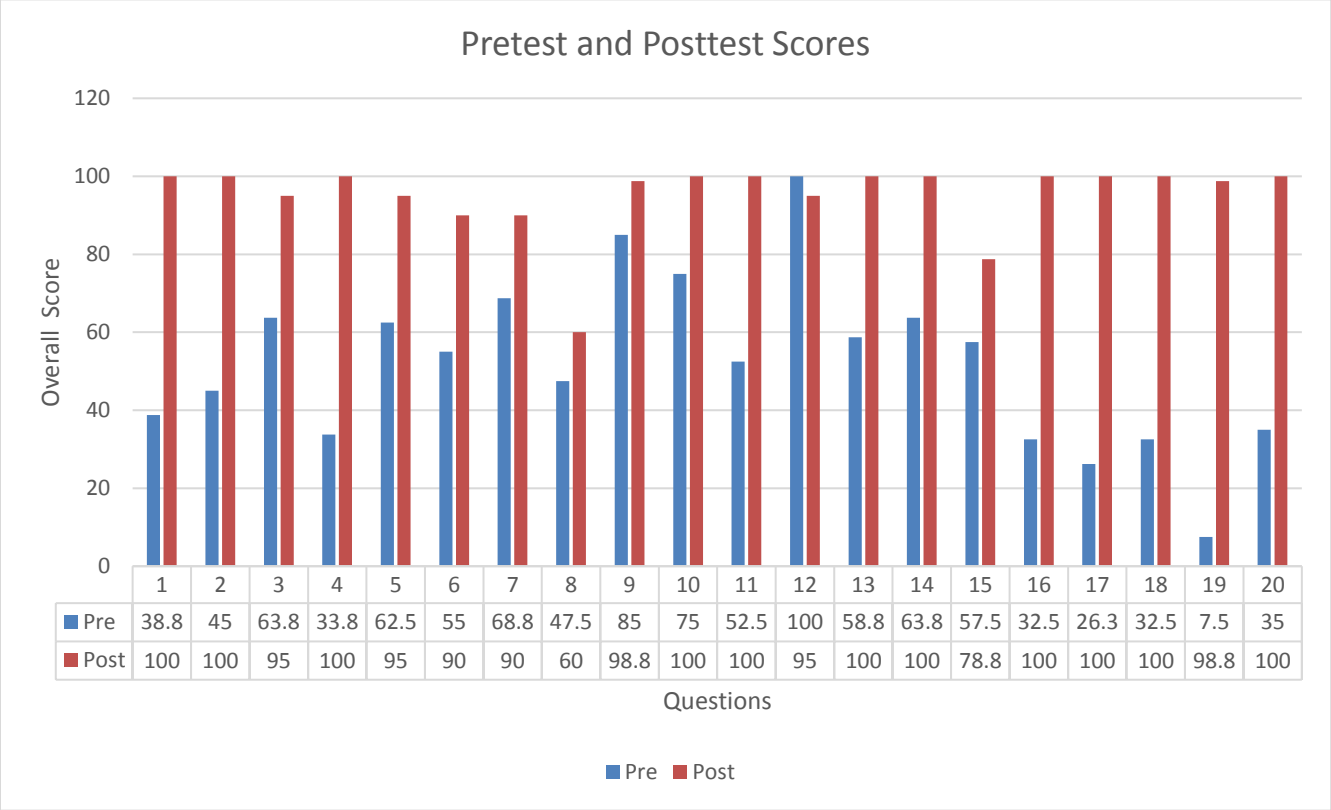
Descriptive Statistics

The descriptive statistics section, depicted in Figure 1 and Table 1, illustrates a substantial increase in post-test means across all sections and the overall score compared to the pretest. Moreover, a noticeable reduction in standard deviation and variance in post-test results suggests a more consistent performance among the study participants. The post-test mean values

indicate a substantial increase across all sections, including the overall score (See Figure 1 and Figure 2). For instance, in Section 1, the mean score increased from 12.93 in the pretest to 19.84 in the post-test, indicating an increase of 6.91 points (See Table 1 and Figure 2). Similar calculations can be made for each section to provide the specific values with which the post-test mean increases. Concerning the increase range, the overall mean score increased significantly from 49.46 in the pretest to 95.49 in the post-test, with a mean difference of 46.03 (See Table 1). This implies that, on average, participants experienced a substantial improvement of approximately 46 points in their scores after the intervention. This increase provides a clear and quantifiable measure of the effectiveness of the educational intervention.

Pretest and Posttest Analysis

Figure 1. *Pretest and Post-Test Scores*



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Pre	38.8	45	63.8	33.8	62.5	55	68.8	47.5	85	75	52.5	100	58.8	63.8	57.5	32.5	26.3	32.5	7.5	35
Post	100	100	95	100	95	90	90	60	98.8	100	100	95	100	100	78.8	100	100	100	98.8	100

Figure 2. *Pretest and Posttest Score Mean*

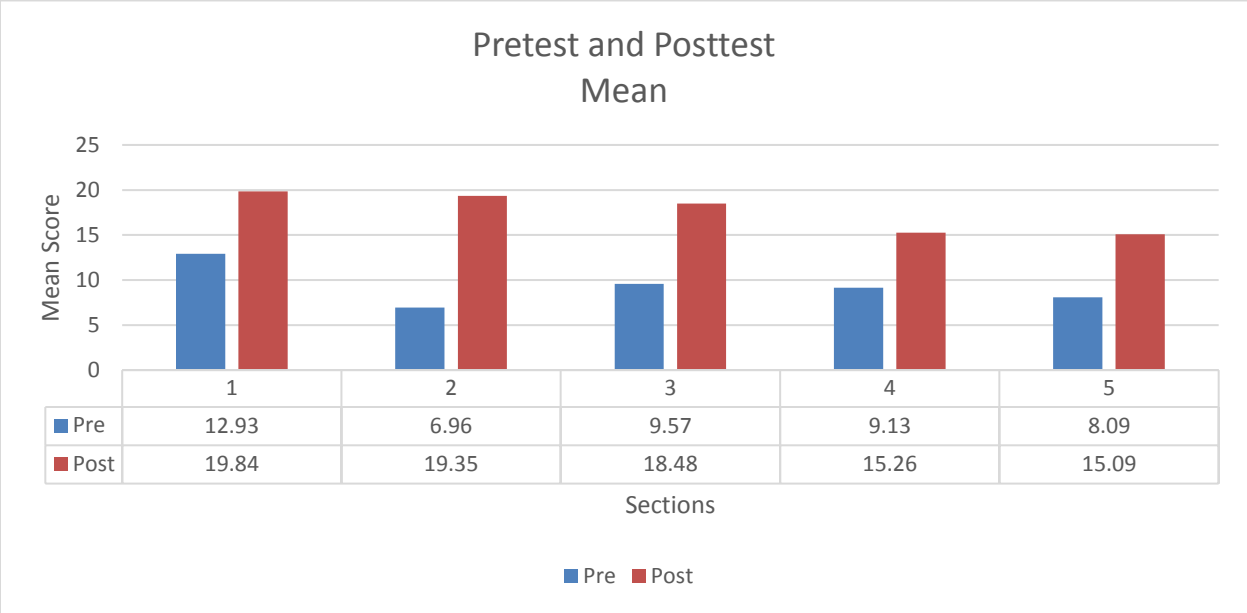
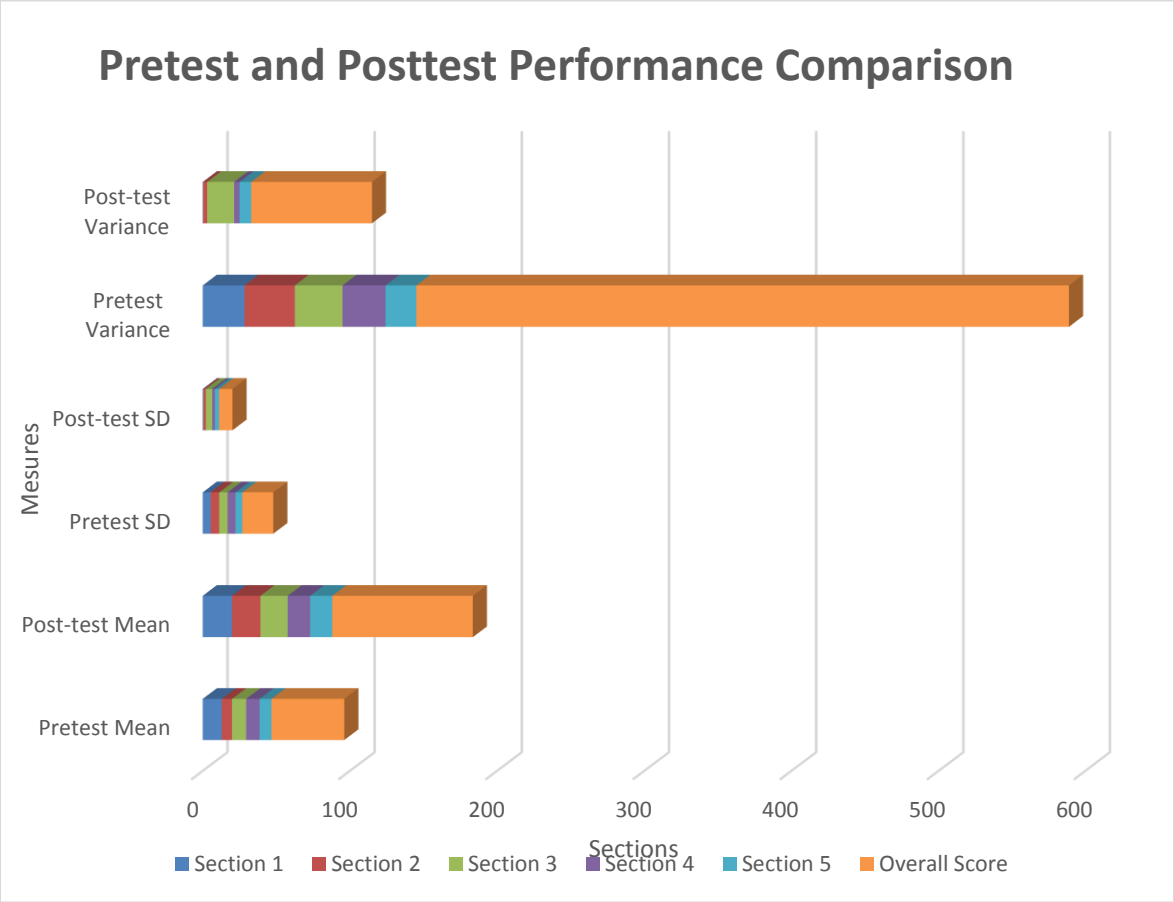


Table 1

Pretest and Post-Test Descriptive Statistics

Measure	Pretest Mean	Post-test Mean	Pretest SD	Post-test SD	Pretest Variance	Post-test Variance
Section 1	12.93	19.84	5.32	0.42	28.34	0.18
Section 2	6.96	19.35	5.85	1.68	34.22	2.84
Section 3	9.57	18.48	5.69	4.28	32.42	18.34
Section 4	9.13	15.26	5.41	1.92	29.24	3.67
Section 5	8.09	15.09	4.58	2.81	20.95	7.91
Overall Score	49.46	95.49	21.06	9.06	443.73	82.03

Figure 3. *Pretest and Post-test Performance Comparison*



Comparative Analysis

The comparative analysis section reveals significant improvements from the pretest to the post-test across all sections and an overall score, as indicated in Table 2 by high *t*-values, very low *p*-values, and substantial effect sizes (Cohen's *d*) (See Figure 4).

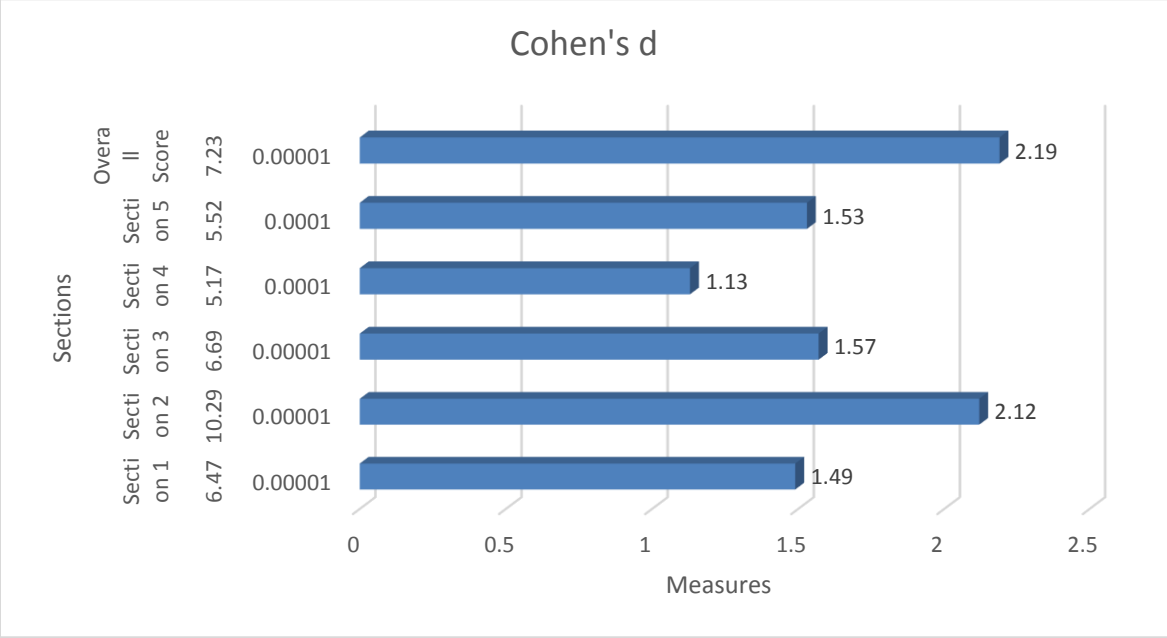
Table 2 and Figure 4 present the comparative analysis, indicating significant improvements from pretest to post-test. High *t*-values, very low *p*-values (< 0.00001), and substantial effect sizes (Cohen's *d*) underscore the statistical and practical significance of the intervention. A *t*-value of 6.47, Cohen's *d* of 1.49, and a *p*-value < 0.00001 for Section 1 exemplify the considerable impact of the intervention on knowledge and skills.

Table 2

Paired Samples t-Test (Pre and Post-test)

Measure	*t*-Value	*p*-Value	Cohen's *d*
Section 1	6.47	< 0.00001	1.49
Section 2	10.29	< 0.00001	2.12
Section 3	6.69	< 0.00001	1.57
Section 4	5.17	< 0.0001	1.13
Section 5	5.52	< 0.0001	1.53
Overall Score	7.23	< 0.00001	2.19

Figure 4. *Cohen's D for Pre- and Posttest*



Correlation Analysis

The type of correlation analysis utilized for gleaning correlation between survey sections was Pearson correlation analysis (Rovetta, 2020). Table 3 demonstrates positive correlations between sections and overall scores. Statistically significant correlations (marked by asterisks)

suggest interrelated performance across different sections. For example, a strong positive correlation (0.8) between Section 1 and Section 2 emphasizes the interconnectedness of knowledge and skills.

Table 3

Correlation Coefficients

Measure	Section 1	Section 2	Section 3	Section 4	Section 5	Overall Score
Section 1	1	-	-	-	-	-
Section 2	0.8*	1	-	-	-	-
Section 3	0.65*	0.72*	1	-	-	-
Section 4	0.40*	0.55*	0.48	1	-	-
Section 5	0.60*	0.65*	0.75*	0.35	1	-
Overall Score	0.75*	0.85*	0.92*	0.60*	0.80*	1

Discussion

Summary of Key Findings

The results showed a statistically-significant improvement in scores in each of the five sections between pre-test and post-test. This suggests that the intervention was effective in fostering the practices and understanding necessary for the participants to obtain more accurate blood pressure measurements in their clinical settings. Correlation coefficients underlined how increases in understanding in one section (knowledge) were related to increases in other sections (skills). Thus, it can be concluded that the intervention had a positive impact on each of these interconnected areas associated with blood pressure measurement. Cohen's D showed that the

largest effect size was for the overall score. This suggests that the intervention was most effective at improving participant scores across the entire survey, rather than centered on any of the five specific sections. Therefore, it is reasonable to conclude that the intervention was effective at improving all of the test areas (practice, knowledge, skills) that contribute to a repeatably accurate and blood pressure measurement. The very low p values for each section and the overall score further suggested that the results were highly statistically significant.

Interpretation of Findings

The findings align with those of other studies that carried out similar quality improvement interventions on the subject of blood pressure measurement. An earlier study also found that an intervention improved the accuracy of blood pressure measurements of practitioners, although this study utilized unannounced medical records audits (Boonyasi et al., 2018). The researchers in the study found that clinics were less likely to recheck blood pressure measurements after implementing the intervention protocol. However, the present study did not utilize automated devices, but instead included the component of clinical training and education in the form of the in-person intervention.

Theoretical Implications

The theoretical framework for the study was Lewin's change theory, and one insight gleaned from the study with respect to the theory was that unfreezing of change can occur with the use of a pre-test. This is a valuable step in unfreezing because the poor results primed the participants for change and suggested avenues for change and areas to focus on in the intervention component. The primary investigator believes that the participants were forced to evaluate the state of their own knowledge about blood pressure measurement in taking the pre-test, which focused their minds on improvement so that they were especially engaged on learning

and practice during the intervention. Moreover, the change construct of Lewin's theory was facilitated in making special emphasis on areas where the participants had performed poorly in the pre-test.

Practical Implications

The results suggest that similar quality improvement programs and educational interventions can address both knowledge and practice gaps in blood pressure measurement by medical assistants at a relatively low cost. This has the further implication that health outcomes and financial indicators can be likewise improved as knock-on effects, especially for primary health care facilities that are similar to the setting chosen for the present study. The rise of hypertension in the United States and worldwide, combined with labor shortages and training shortfalls that compound this issue, strongly suggested that healthcare administrators and practitioners alike should pursue similar quality improvement programs to bring medical assistants up to speed. Secondly, although pre-test and post-testing was incorporated here mainly to evaluate the intervention's effectiveness, it may be appropriate to integrate pre-testing and post-testing into the intervention itself in order to achieve the full benefits to blood pressure measurement accuracy indicated by the statistical results.

The study results provide valuable insight into the effectiveness of the implemented educational intervention. The analysis is divided into three key areas: descriptive statistics, comparative analysis, and correlation analysis. Each of these areas contributes to a comprehensive understanding of the impact of and relationships between the data.

Limitations

Limitations for the present study include that it involved a small participant group of only 23 individual medical assistants. To make the results more robust and generalizable, additional

replication studies should be undertaken to further evaluate the effectiveness of the intervention for the purposes of improving blood pressure measurement by medical assistants working in primary care facilities. Another limitation is that the survey pre-test and post-test, provided through Qualtrics, were in English, while a significant portion of medical assistants in the Miami-Dade county area speak Spanish as a first language and English as a second language. This could have had the effect of depressing the scores of any Spanish as a first language participants and of exaggerating the positive impact of the intervention in the final results. A further limitation is the focus on medical assistants in the Miami-Dade county area, whereas it is unclear if the results can be generalized in a valid way to medical assistants operating in other regions of the United States or abroad.

Suggestions for Future Research

As noted, replication studies of the present study would be helpful in extending and confirming, or challenging, the results. The study could be carried out in regions outside of Miami-Dade county in order to glean any geographical differences.

The study results provide valuable insight into the effectiveness of the implemented educational intervention. The analysis is divided into three key areas: descriptive statistics, comparative analysis, and correlation analysis. Each of these areas contributes to a comprehensive understanding of the impact of and relationships between the data.

Descriptive Statistics

Descriptive statistics reveal a substantial increase in post-test mean scores across all sections and the overall score compared to the pretest scores. This improvement suggests that the intervention was effective in enhancing the participants' abilities or knowledge in the areas assessed by the different sections. Notably, the standard deviations and variances in the post-test

scores are significantly lower than those in the pretest scores, indicating reduced score variability (Kubiszyn & Borich, 2015). This reduction suggests a more consistent performance among participants after the intervention, which could be attributed to a more uniform understanding or skill level achieved through the program. The consistency in performance improvement across all sections also implies that the intervention was comprehensive, effectively addressing multiple facets of the subject matter. The variance, which indicates the degree of spread in the data, shows a dramatic decrease, reinforcing the notion that the post-test performances were not only improved but also more homogenous.

Comparative Analysis

The *t*-values, which are significantly high across all sections and the overall score, indicate a strong statistical difference between the pretest and post-test results. The comparative analysis, utilizing a paired samples *t*-test, provides a statistical basis to affirm that the differences observed in the pretest and post-test scores are not due to chance (Ifenthaler & Yau, 2020). The *p*-values, being less than 0.05 (in most cases, much lower) reinforce this conclusion, suggesting that the probability of these differences occurring by chance is extremely low. Cohen's *d* values, representing the effect size, are considerably high in all cases, signifying that the intervention substantially impacted the participants' performances. These effect sizes vary across the sections, which could be due to differences in the difficulty of content, the participants' initial familiarity with the content, or the effectiveness of the intervention in different areas. Nonetheless, the overall high effect sizes indicate that the intervention enhanced the participants' capabilities.

Correlation Analysis

Positive correlations suggest that participants who performed well in one section and the overall score tended to perform well in other sections. The correlation analysis reveals interesting

relationships between the performances in different sections and the overall score (Kim & Burić, 2020). This interrelationship could indicate underlying factors such as overall aptitude, motivation, or the effectiveness of the intervention in uniformly improving participants' abilities across different areas.

Results With Implications for Advanced Practice Nursing

Promoting accurate blood pressure measurement is essential, as hypertension is a leading cause of cardiovascular diseases. Implementing a competency-based training program is crucial for enhancing patient quality of life and aligning with a quality improvement approach. Accurate blood pressure readings and measurements are significant for proper screening, diagnosing, and monitoring of high blood pressure. The correct measurement approach requires proficiency in measuring blood pressure, and re-training is needed for skill maintenance every 6 to 12 months (Hayer et al., 2022). The results revealed that accuracy in measuring blood pressure is essential in diagnosing and correcting the underlying treatment that may result in life-threatening situations. As medical assistants are assigned with this duty, providing them with training and education concerning exact blood pressure readings may alleviate hypertension in the healthcare system. The results have substantial implications on the leadership because they will allow the establishment of proper protocols and guidelines, and leaders should implement interventions to use them in routine practice. The training would enhance the knowledge of novice medical assistants and practitioners, allowing them to guide and educate patients regarding their lifestyle and its impact on blood pressure.

Conclusions

Hypertension is the leading cause of death and disability; therefore, interventions are needed for accurate measurement and advancement in knowledge for better productivity and

health outcomes. Many healthcare practices significantly impact the population’s health and conduct. The blood pressure measurement technique is important in enhancing the quality of life and promoting wellness.

Medical assistants are a critical part of the healthcare industry. Competency in accurate blood pressure measurement can yield productive health outcomes and improve healthcare quality. The results of this study demonstrate the educational intervention's effectiveness in enhancing the participant's knowledge or skills. The consistent improvements across all sections, the statistical validation of these improvements, and the interrelated nature of the performances offer strong evidence of the program's success. These findings imply that comparable techniques could be helpful in other circumstances, which has significant implications for future program creation and implementation. The study also emphasizes how critical it is to evaluate and analyze the effects of training or educational interventions utilizing a multimodal approach.

The educational intervention has done a great job of accomplishing its goals. The study emphasizes how important it is to have a well-thought-out intervention and conduct thorough data analysis in order to comprehend and enhance training and educational programs. Hence, these insights can guide the development of more effective programs and interventions, improving outcomes in various educational and professional settings.

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Appendix

Appendix A: IRB Approval Letter

FIU | FLORIDA INTERNATIONAL UNIVERSITY

Office of Research Integrity
Research Compliance, MARC 430

MEMORANDUM

To:	Dr. Dana Sherman
CC:	Gretel Dominguez
From:	Kourtney Wilson, MS, IRB Coordinator KMW
Date:	July 20, 2023
Protocol Title:	"Medical assistants competency based training program on the proper blood pressure measurement techniques. A quality improvement project."

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt via the **Exempt Review** process.

IRB Protocol Exemption #:	IRB-23-0395	**IRB Exemption Date:**	07/20/23
TOPAZ Reference #:	113346		

As a requirement of IRB Exemption you are required to:

1) Submit an IRB Exempt Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved prior to implementation.
2) Promptly submit an IRB Exempt Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.
3) Submit an IRB Exempt Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

KMW

Appendix B: Letter of Support

CareMax

Cristina.agostinelli@caremax.com
1000 NW 57th Ct., suite 400, Miami, FL 33126

July 10, 2023
Dana Sherman, DNP, APRN, ANP-BC, FNP-BC
Clinical Associate Professor
Florida International University
Nicole Wertheim College of Nursing and Health Sciences

Dear Dr. Dana Sherman,

I am pleased to write this letter in support of this Doctor of Nursing Practice quality improvement project. This letter affirms that CareMax will be the study site for a quality improvement project titled "Medical Assistants Competency Based Training Program on the Proper Blood Pressure Measurement Techniques". The study will be led by Dr. Dana Sherman, faculty at Florida International University, in collaboration with Gretel Dominguez APRN, Doctor of Nursing Practice student.

The project will be conducted in three phases. The first phase will be the administration of a pre-test to measure the medical assistants' competency in blood pressure measuring techniques which will be followed by a competency-based educational session. The third phase will be the administration of a post-test to measure medical assistants' knowledge of the education provided.

This letter confirms the willingness of CareMax to participate in this Doctor of nursing Practice quality improvement project and acknowledges the study will not commence until the study protocol is approved by Florida International University's Institutional Review Board (IRB).

Sincerely,

Cristina Agostinelli, MD
Medical Director

Appendix C: Informational Letter

INFORMATIONAL LETTER

Medical Assistants Competency Based Training Program on the Proper Blood Pressure Measurement Techniques

Hello, my name is Gretel Dominguez. You have been chosen to be in a research study regarding medical assistants' knowledge of the proper blood pressure measurement techniques. The purpose of this study is to provide a competency based training program for medical assistants on the proper blood pressure measurement techniques that will lead to positive clinical outcomes. If you decide to be in this study, you will be one of twenty-five medical assistants eligible to participate in this research study. If you agree to be in the study, I will ask you to do the following things:

1. Read this informational letter which delineates voluntary and anonymous participation in this study and complete a pretest questionnaire.
2. Attend a competency-based educational session and complete a post-test.

There are no foreseeable risks or benefits to you for participating in this study. It is expected that this study will benefit society by improving medical assistants' blood pressure measurement techniques that will lead to proper identification and treatment of cardiovascular complications and avoid end-organ damage.

There is no cost or payment to you. If you have questions while taking part, please stop me and ask. You will remain anonymous, and your answers are confidential.

If you have questions for one of the researchers conducting this study, you may contact Dr. Dana Sherman, FIU Faculty, at (305) 348-4227, or Gretel Dominguez, DNP student, at (786) 597-4749.

If you would like to talk with someone about your rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to stop. You may keep a copy of this form for your records.

Appendix D: Pretest and Posttest Questionnaire

FLORIDA INTERNATIONAL UNIVERSITY

PRETEST AND POSTTEST QUESTIONNAIRE

Medical Assistants Competency Based Training Program on the Proper Blood Pressure Measurement Techniques

1. **What is one of the most important reasons to correctly diagnose high blood pressure and treat patients who have it?**

Because it's part of my job description

To lower the risk of heart disease

To lower the risk of malpractice

To achieve patient satisfaction score requirements

2. **A new patient has arrived for his first visit. You do not see any previous blood pressure readings on the patient's records. Which arm should you use to measure the blood pressure?**

Not take the patient's blood pressure

Measure blood pressure in the patient's right arm only

Measure blood pressure in the patient's left arm only

Measure blood pressure in both the patient's arms

3. **Which of the following patient actions increases the chances of inaccuracies during blood pressure measurement? Select ALL that apply.**

Crossing their legs

Talking on a cellphone

Standing

Sitting with their back supported

4. **Which of the following actions should a patient AVOID doing for 30 minutes prior to their blood pressure measurement at a doctor's office? Select ALL that apply.**

Smoking

Drinking a caffeinated energy drink

Exercising

Eating a sandwich

5. **What is the minimum number of measurements needed to obtain an accurate estimate of a patient's blood pressure?**

1

2

3

4

6. **What is the minimum number of minutes that a patient should rest before getting a blood pressure measurement?**

3 to 5

6 to 8

9 to 12

12 to 15

7. **Which of the following types of devices are preferred for measuring blood pressure?**

Manual and semiautomated

Manual and fully automated

Fully automated and semiautomated

Wrist and semiautomated

8. **The blood pressure cuff artery indicator needs to be aligned with which artery:**

Brachial artery

Radial artery

Ulnar artery

Axillary artery

9. What blood pressure is considered stage 1 hypertension?

Less than 120/80 mm Hg

120 to 129 mm Hg systolic *and* less than 80 mm Hg diastolic

130 to 139 mm Hg systolic *or* 80 to 89 mm Hg diastolic

≥140 mm Hg systolic *or* ≥90 mm Hg diastolic

10. What blood pressure is considered stage 2 hypertension?

Less than 120/80 mm Hg

120 to 129 mm Hg systolic *and* less than 80 mm Hg diastolic

130 to 139 mm Hg systolic *or* 80 to 89 mm Hg diastolic

≥140 mm Hg systolic *or* ≥90 mm Hg diastolic

11. What is considered normal blood pressure?

Less than 120/80 mm Hg

120 to 129 mm Hg systolic *and* less than 80 mm Hg diastolic

130 to 139 mm Hg systolic *or* 80 to 89 mm Hg diastolic

≥140 mm Hg systolic *or* ≥90 mm Hg diastolic

12. What is one of the advantages of using a fully automated blood pressure device?

It obtains a single measurement

The cuff is inflated manually

It takes multiple spaced measurements

It is the gold standard for measurements

13. What is the best position for a patient's arm during a blood pressure measurement?

Straight out in front of the chest at heart level

Hanging straight down and relaxed at the side

Above the head with the hand clenched into a fist

Resting on a table at heart level with the palm facing up

14. Which of the following is the best place for a patient to sit while you take a blood pressure measurement?

A short stool

An armless chair

An exam table

A chair that provides proper back support

15. What is the best position for a patient's feet during a blood pressure measurement?

Flat on the ground

Crossed at the ankle

Above the ground

On the tip of toes

16. For a proper fit, how much of the cuff's air bladder should wrap around the patient's bare upper arm?

25% or less

25% to 50%

50% to 75%

75% to 100%

17. Which of the following statements is correct regarding proper patient positioning for blood pressure measurement?

Patient should distract themselves by talking or texting on their cellphone

Patient should sit up straight with their back away from the chair

Patient should have their arm supported at heart level with palm faced-up and muscles relaxed

Patient should have their feet relaxed and dangling off the exam table

18. Which part of the cuff's air bladder should be placed over the patient's brachial artery?

Right edge of the bladder

Middle of the bladder

Left edge of the bladder

Any portion of the bladder

19. How snug should you make the blood pressure cuff before you inflate it?

1 finger fits easily underneath and 2 fingers feels snug

Loose enough so the patient feels comfortable

2 fingers fit easily underneath, and 3 fingers feels snug

Tight enough so the patient feels uncomfortable

20. What should you know to accurately measure, diagnose, and treat hypertension as part of a team?

Working together with your team members is key

You must know your own roles and responsibilities

Your team members should all use the same checklist

All the above