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A Quality Improvement Project On Blood Pressure Measurement: Are We Failing Our Patients?

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A QUALITY IMPROVEMENT PROJECT ON BLOOD PRESSURE MEASUREMENT: ARE WE FAILING OUR PATIENTS?

by

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ABSTRACT

Despite billions of dollars invested in research, education, and equipment, high blood pressure remains a significant contributor to mortality rates across the globe. According to the Centers for Disease Control (2019), hypertension was listed as a primary or contributing cause of over a half-million deaths in the United States (Centers for Disease Control [CDC], 2021). Without regard to race, gender, background, or socioeconomic level, this "silent killer" the Mississippi State Department of Health estimated that over 700,000 Mississippi adults were diagnosed with high blood pressure and thousands more at an increased risk each year (MSDH, 2019). Failure to identify and effectively manage high blood pressure is a significant contributing factor in these deaths.

The Centers for Disease Control and Prevention (CDC) report that only one in four adults have adequate knowledge and resources to control their high blood pressure (CDC, 2021). Individuals with high blood pressure are often unaware they have the disease due to the lack of signs and symptoms and with many Americans lacking health insurance and access to primary health care, high blood pressure is often not detected until the individual presents to the healthcare facility upon their initial visit or on subsequent visit for an unrelated complaint.

The objective of this DNP project was to assess the knowledge and technique of nursing staff personnel assigned to rural and underserved Federally Qualified Health Centers (FQHC) in Mississippi when obtaining blood pressure readings in the adult population. Incorrect technique and/or poor interviewing skills can potentially result in the APRN misdiagnosing hypertension, committing errors in prescribing antihypertensive

and other cardiovascular medications, ineffective management of the hypertensive patient, and possible litigious actions on behalf of the patient.

A retrospective unbiased assessment of blood pressure measurements was conducted in the clinical setting 4 weeks before the beginning of the intervention utilizing a checklist that was developed based on guidelines and recommendations published by the American College of Cardiology (Blood Pressure Assessment: JACC Expert Panel Report, n.d.).

ACKNOWLEDGMENTS

Special recognition to Dr. Lisa Morgan, who served as the committee chair, and Dr. Lakenya Forthner, who served as a committee member for this DNP project. An FQHC in rural Pearl River County was utilized during the completion of the DNP project. The FQHC granted access to their facility, daily operational structure, and other resources identified as necessary to complete this DNP project.

DEDICATION

I would like to take this opportunity to recognize all my mentors and coworkers who have impacted my life over the last 40 years and have made this possible. I would also like to thank my nursing professors for their patience, guidance, and words of encouragement during the completion of this DNP project. Lastly, I would like to dedicate all the time, work, and effort put into completing this DNP project to the two most important things in my life, Anita and Kai.

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LIST OF ABBREVIATIONS

ACC	American College of Cardiology
AHA	American Heart Association
ANA	American Nurses Association
CDC	Centers for Disease Control
FQHC	Federally Qualified Health Center
HTN	Hypertension
IRB	Institutional Review Board
SeMRHI	Southeast Mississippi Regional Health Initiative
USM	The University of Southern Mississippi

CHAPTER I – INTRODUCTION

High blood pressure afflicts millions of people with no regard to gender, race, nationality, or geographical location. According to Statista, healthcare providers diagnosed 44.1% of the population with hypertension (The Statistics Portal, 2023). The Mississippi State Department of Health (MSDH) published data referencing that over 700,000 individuals were found to have some form of high blood pressure with thousands more at considerable risk.

The American College of Cardiology (ACC) and the American Heart Association (AHA, 2019) utilize two stages of parameters to define hypertension. Stage 1 hypertension is defined as any reading of 130/80 mmHg or higher, while Stage 2 hypertension is a blood pressure reading at or above 140/90 mmHg.

The Centers for Disease Control and Prevention (CDC), identifies high blood pressure as a significant risk factor for the development of chronic cardiovascular and renal diseases, and life-threatening conditions such as heart attack and stroke. The American Heart Association refers to high blood pressure as the “silent killer” due to individuals ignoring or failing to recognize signs or symptoms of the disease. If signs and symptoms are present, common complaints of high blood pressure can include headache, visual disturbances, and dizziness. Unfortunately, persistent, or uncontrolled high blood pressure may result in considerable damage to the lining of arteries and chambers of the heart.

Evidence-based data related to high blood pressure is available to be utilized when educating the patient and their family members. The American Heart Association (AHA, 2019) has outlined modifiable and non-modifiable risk factors related to high

blood pressure to be utilized when educating patients. Modifiable risk factors that may prevent and assist in managing high blood pressure include increasing the amount and intensity of physical activity, consuming healthy nutritious food, lowering and managing stress levels, weight reduction and lowering Body Mass Index (BMI), reducing and eliminating alcohol consumption, amount and quality of sleep, eliminating tobacco use, lowering cholesterol and triglyceride levels, and managing and preventing diabetes. Non-modifiable risk factors that the patient has no control over include family history, race, age, and gender (AHA, 2019).

The American College of Cardiology (ACC) has completed extensive research and published a significant amount of data related to the importance of obtaining, recording, and reporting accurate blood pressure measurements when managing and screening for hypertension (Blood Pressure Assessment: JACC Expert Panel Report, n.d.). Accurate and timely reporting of blood pressure measurements is essential in ensuring proper diagnosis of abnormal blood pressure readings and management of an existing blood pressure condition (Muntner, et al., 2019).

In the clinical setting, blood pressure is assessed with an aneroid sphygmomanometer or an oscillometer device. Both devices require frequent calibration, every two to four weeks for handheld devices and three to six months for wall-mounted devices by appropriate medical maintenance personnel. These inspections are a crucial factor in ensuring nursing staff are reporting accurate measurements to the medical practitioner.

Significance of the Problem

Hypertension is the most common preventable cause of cardiovascular disease (AHA, 2019). With over a half-million Mississippi residents diagnosed or at risk of developing hypertension at some point in their lifetime, Mississippi has continually ranked at or near the bottom of the 50 states and the District of Columbia in overall mental and physical health (MSDH- Home, n.d.). In 2019, 43.6% of Mississippi residents were diagnosed by a health professional with high blood pressure, compared to the national average of 32.5% (America's Health Rankings, 2021). Investigating how these health disparities adversely affect population health has been a key component in developing federal, state, and local policies and improving health outcomes (Comparing Health Equity & SDoH Indices/RTI Health Advance, n.d.).

Accurate reporting of blood pressure measurements to the medical practitioner is essential in guiding the provider's diagnosis and management decisions, preventing adverse outcomes, and preventing unnecessary financial costs related to medical procedures and medications (Butler et al., 2017).

Problem Statement

The purpose of this DNP project was to confirm that nursing staff personnel assigned to rural and underserved FQHCs in Mississippi were aware of and utilizing evidence-based methodology when assessing blood pressure measurements in the adult population. Incorrect technique and/or poor interviewing skills can potentially result in misdiagnosis, errors in prescribing medications, and possible litigious action on behalf of the patient.

The desired outcome of this DNP project was to modify and improve previously identified improper techniques and interviewing skills utilized during the screening process. Collected data and recommendations will be presented to health center staff through in-services, handouts, and face-to-face meetings. The provider and the health center staff will use these recommendations as a tool to correctly diagnose hypertension, to ensure the patient is prescribed the appropriate anti-hypertensive medication, and to educate the patient on the proper technique to use when obtaining a blood pressure measurement at home. This data will also benefit in reducing the percentage of rural community residents diagnosed with high blood pressure, will increase awareness, and will enhance health equity throughout rural communities in Mississippi.

Available Knowledge

Evidence-based research conducted by the American College of Cardiology (ACC) and the American Heart Association (AHA) shows a direct link between lowering blood pressure and reducing the risk of developing cardiovascular disease (Experts Stress Importance of Accurate Blood Pressure Screenings, n.d.). Environment and location can impact blood pressure measurements. Research reflects significant differences between measuring blood pressure in a clinical setting versus obtaining a reading in the home environment (Muntner, et al., 2019).

There has been significant debate and research related to the effectiveness of obtaining blood pressure manually utilizing a sphygmomanometer as opposed to measuring blood pressure mechanically with an oscillometer or another mechanical device. Recent advances in wearable technology that are cuffless, convenient, and

noninvasive can monitor cardiac functions such as blood pressure, heart rate, and heart rhythm continuously (Abu Baker Shiekh et al., 2023).

As a medical practitioner, the diagnosis of hypertension is primarily based on blood pressure readings obtained in the clinical setting. Blood pressure readings may differ significantly when measured in the clinical setting and when measured outside the medical facility. Two factors can be attributed to this difference. The first factor is an increased anxiety level when visiting the physician, also known as "white coat hypertension." The individual with "white coat hypertension" consistently presents with a higher blood pressure reading in the clinical environment and reports lower readings when measured outside this environment (Shimbo et al., 2020). The second factor, masked hypertension, is defined as higher out-of-clinic blood pressure readings compared to normal in-clinic readings. These phenomena may result from stress, and behavioral factors such as tobacco use, caffeine, other stimulants, alcohol use, and contraceptive use in females (Cohen, 2020).

Needs Assessment

Hypertension is the most common preventable cause of cardiovascular disease (AHA, 2019). With over a half-million Mississippi residents diagnosed or at risk of developing hypertension at some point in their lifetime, Mississippi has continually ranked at or near the bottom of the 50 states and the District of Columbia in overall mental and physical health (MSDH, n.d.). In 2019, 43.6% of Mississippi residents were diagnosed by a health professional with high blood pressure, compared to the national average of 32.5% (America's Health Rankings, 2021). Investigating how these health disparities adversely affect population health has been a key component in developing

federal, state, and local policies and improving health outcomes (Comparing Health Equity, n.d.).

Accurate reporting of blood pressure measurements to the medical practitioner is essential in guiding the provider's diagnosis and management decisions, preventing adverse outcomes, and preventing unnecessary financial costs related to medical procedures and medications (Butler, et al., 2017).

The Southeast Mississippi Regional Health Initiative (SeMRHI) acknowledged the lack of health equity throughout the Gulf Coast and developed the idea for the FQHC on the Gulf Coast. The first health center in Mississippi was established in 1978 in Biloxi. Over the past 40 years, these health centers have increased their footprint throughout the state to currently operating 22 health centers in George, Greene, Hancock, Harrison, and Jackson counties. These health centers offer assistance to its residents in several areas including chronic and acute health conditions, OB-GYN, pediatrics, behavioral health, optometry, dental, financial, and programs for Women, Infants, and Children (WIC).

Mississippi residents who seek out medical care at these health centers and are diagnosed with high blood pressure, often express frustration in attempting to comply with their provider's recommendations because the provider fails to take into consideration the patient's financial status, educational background, and community resources. While developing a treatment plan, the provider must take these and other applicable factors into consideration.

Synthesis of Evidence

Evidence-Based Practice Search

During the DNP project's development, the University of Southern Mississippi online library was used to help in the literature search. Databases used to review pertinent and current data related to the DNP project included CINAHL, PubMed, Medline, and Cochrane Library. A search through these databases produced approximately 50 evidence-based articles pertaining to the DNP project. Keywords created from the PICOT included frequently used terms such as hypertension, African Americans, social determinants of health, and educational barriers.

Critical Appraisal

The literature examines the different requirements necessary to measure accurate blood pressure and the responsibilities of the staff and the patient in monitoring and managing blood pressure disorders. Despite extensive and expensive research and public service campaigns, high blood pressure remains the greatest contributor to heart disease. The healthcare industry has a responsibility to advocate for continued research and effective strategies to inform those at-risk individuals who lack awareness and those with undiagnosed or uncontrolled hypertension (Zoellner et al., 2014). The United States continues to experience pervasive racial and ethnic inequities across all state health systems, with considerable disparities in health and health care between white and American Indian/Alaska Native, Black, and Latinx/Hispanic individuals (Report Finds Widespread Health Inequities in the United States, n.d.). Health literacy is defined as “the degree to which individuals can obtain, process, and understand basic health information and services required to make appropriate health decisions” (Wood, 2005).

Barriers to Managing Hypertension

According to Schultz et al. (2018), patients who are non-compliant with anti-hypertensive pharmacological and non-pharmacological recommendations, are at an increased risk for cardiovascular diseases, renal disease, cerebrovascular accidents, and other adverse outcomes. In 2021, the CDC listed five key elements that create barriers for the patient managing their high blood pressure. These five key elements included socioeconomic factors, healthcare system-related factors, medically diagnosed condition factors, and patient-related factors.

Additional factors that were commonly identified throughout the various articles included the inability to refill medication, experiencing medication side effects, poor communication with the healthcare provider, difficulty in securing an appointment, and frustration with the lack of continuity with a single provider. APRNs and other healthcare providers, who are assigned to and provide care to underserved and low socioeconomic communities, should establish a plan that assesses self-management behaviors, socioeconomic barriers, and mental health barriers that may prevent patients from complying with recommendations in managing their hypertension.

The APRN should identify barriers to managing hypertension by enlisting the cooperation of community leaders and established healthcare professionals who will provide valuable insight into the community. This action will assist in establishing a trusting and respectful relationship between the provider and the community, convey the message that the provider is invested in all aspects of the community's health, and result in positive health outcomes (Pettey et al., 2016).

The provider and the patient have responsibilities during and after the patient visit. The provider should be technically and tactically proficient, convey caring behavior, possess effective interpersonal skills, and advocate for the mental and physical health of their patients. The patient has a responsibility to be honest with the provider and other healthcare staff, comply with treatment recommendations, and inform the provider and their staff of any circumstances that may prevent adherence to the plan (Butler, 2017).

In 2021, the single most critical factor affecting the management of hypertension is socioeconomic factors. Illiteracy, unemployment, out-of-pocket costs in purchasing medication, lack of adequate health insurance, generational cultural beliefs mistrusting and a lack of confidence in the healthcare system, and difficulty gaining access to healthcare due to limited transportation resources, and an ineffective or non-existent family support system were commonly identified as barriers in managing hypertension (Schultz, 2018).

Rationale

Framework and Theory

The theory of goal attainment will be used in completing the DNP project. This theory was initially published in the 1960s by renowned nursing theorist Imogene King and explores factors such as the definition of roles, stress, space, and time, which may prevent attaining goals (King, 1981). King's critical concept focuses on the professional relationship between the nurse and the patient. Through dialogue and compromise, goals are set, and a plan is developed and agreed upon that will meet these goals over a period.

Specific Aims

This DNP project was to determine the effectiveness of blood pressure measurement techniques by nursing staff assigned to a Federally Qualified Health Center within the Southeast Mississippi Regional Health Initiative. These health centers are a vital resource to access care for an underserved and marginalized community whose population presents a higher risk of being diagnosed with hypertension due to poor social drivers of health. To elevate the skill level of the staff, patient encounters will be observed with a briefing on the findings. Recommendations for staff and patient education will improve blood measurements in the clinical setting and home environment and reduce the risk of misdiagnosing individuals with hypertension.

Measurable Objectives

The DNP project's main objective was to improve blood pressure measurement techniques in the FQHC. After extensive research and careful consideration, Bloom's Taxonomy framework was utilized to develop the following objectives:

- Recall normal blood pressure values according to the American Heart Association (AHA)
- Integrate American College of Cardiology (ACC) blood pressure measurement recommendations into the screening process.
- Effectively communicate the ACC recommendations to the patient as a reference for in-home blood pressure measurements

The Mississippi State Department of Health (MSDH) published data referencing that over 700,000 individuals were found to have some form of high blood pressure with thousands more at considerable risk. The measurable objectives will assist SeMRHI, the

Advanced Practice Registered Nurse (APRN), and the nursing staff to ensure proper techniques are utilized when measuring blood pressure values and become a useful clinical tool in appropriately diagnosing and managing this chronic disease.

Doctor of Nursing Practice Essentials

The eight DNP Essentials established foundational outcome competencies deemed vital for all graduates of an accredited Doctor of Nursing Program regardless of specialty or functional focus (American Association of Colleges of Nursing [AACN], 2006). For the past 20 years, the American Association of Colleges of Nursing (AACN) has promoted the Doctor of Nursing Practice as the entry into advanced practice nursing. The term Doctor of Nursing practice can be confusing and has come under great controversy. Those not familiar with the term incorrectly assume its meaning as Doctor of Nursing Practice and relate the term to a specific role. The Doctor of Nursing Practice is an academic degree awarded to the student for advancing to the highest level in the field of nursing. The Advanced Practice Registered Nurse (APRN) will become an integral member of a healthcare team that must utilize evidence-based practice to meet and solve challenges present in today's society. As a leader of the team, the DNP must become the subject matter expert on nursing science and continually research and understand societal values, beliefs, and ideas that play a role in daily clinical practice (Zaccagnini & White, 2014). Blood pressure measurement is not an exact science, and a variety of factors impact the accuracy of the systolic and diastolic readings. These variables include level of competency, quality of equipment, environmental factors, and patient compliance. A small number of DNP Essentials are highlighted in the DNP

project. Of the eight essentials, Essential III contained the most relevance to the DNP project.

DNP Essential I.

Essential I identifies scientific underpinnings for practice. Essential I support utilizing theory as a tool in creating a framework for the DNP project. This essential is appropriate for this DNP project because it promotes patient involvement in the decision-making process and meeting goals with other healthcare team members to achieve the highest quality of care (Chism, 2013).

DNP Essential II.

Essential II explores an organizational and leadership component that emphasizes practice, continued improvement in achieving positive health outcomes, and ensuring measures are in place to ensure patient safety. This essential will apply to the DNP project by stressing the importance of improving the ability of African American females to manage their hypertension (Zaccagnini & White, 2019).

DNP Essential III.

Essential III explores the importance of locating and utilizing clinical scholarship and analytic methods for evidence-based practice. The APRN must lead from the front in evidence-based practice. To ensure success, they must possess knowledge in development activities. These activities include translating research into practice, effectively evaluating practice, being familiar with activities that improve the reliability of healthcare practice and outcomes and encouraging participation in collaborative research. The APRN who consistently utilizes current evidence-based research and practices to identify and manage barriers to hypertension management, will encourage

other members of the team to also engage in evidence-based research and practice activities (Burns & Grove, 2015).

DNP Essential IV.

Essential IV explores various methods the APRN can utilize information systems as a tool when evaluating programs of care, outcomes of care, and care systems. This DNP project will utilize questionnaires to identify barriers in hypertension management so the patient can be educated on ways to eliminate these barriers and lower the incidence of non-compliance (Zaccagnini & White, 2014).

DNP Essential VI.

Essential VI explores various methods the APRN can utilize information systems as a tool when evaluating programs of care, outcomes of care, and care systems. This DNP project will utilize questionnaires to identify barriers in hypertension management so the patient can be educated on ways to eliminate these barriers and lower the incidence of non-compliance (Zaccagnini & White, 2014).

DNP Essential VII.

Essential VII focuses on how clinical preventive measures and improving population health can be key pieces in improving the overall health of the United States. Dissemination of this DNP project can assist other providers who encounter similar situations within their community. This DNP project can change the focus from focusing on the disease to all aspects of patient health (Zaccagnini & White, 2014).

DNP Essential VIII.

Essential VIII provides insight into building a healthy interdisciplinary environment by integrating the principles of autonomy and independence. This DNP

project will emphasize the importance of enhanced communication across interdisciplinary teams and its positive effects on improving patient outcomes. Meeting this standard will require an APRN leader who displays effective communication skills, integrity, objectivity, and empathy (Chism, 2013).

Logic Model

A logic model is a structured pathway that describes the interprofessional relationship process among the resources, activities, outputs, and the potential outcomes or impacts of the DNP project. This logic model was used to evaluate the effectiveness of the problem's intervention. The DNP project's desired outcome is to develop measures and recommendations to health center staff and key SEMRHI personnel on proper assessment of blood pressure values during the screening process.

Summary

The medical community continues to emphasize the importance of recognizing hypertension at an early onset. Poor technique and poor interviewing skills are barriers to appropriately diagnosing hypertension. Inaccurate blood pressure measurements result in misdiagnosis, incorrect treatment regimens, poor health outcomes, increased medical costs, and increased death rates due to hypertension (Mamaghani, 2020). Effective strategies proposed in this DNP project are needed to increase awareness of the proper methodology when measuring blood pressure. Although the American Heart Association and American College of Cardiology continue to research and publish data and recommendations on the impact of proper blood pressure management, medical staff continue to practice poor techniques when measuring blood pressure. Modifying old habits, developing new habits, continual practice of proper technique, constant

reinforcement, periodic assessments, and persistent research will be required to improve recognizing and managing hypertension in the underserved community.

CHAPTER II – METHODS

Process

The doctoral student utilized one of seventeen Southeast Mississippi Regional Health Initiative (SeMRHI) Federally Qualified Health Centers (FQHC) located in South Mississippi. These FQHCs are community-based organizations that provide comprehensive primary and preventive care, including health, dentistry, and mental health/substance abuse services to the adult and pediatric population, regardless of their ability to pay for services or current health insurance status. The doctoral student scheduled meetings with FQHC staff, and the SeMRHI quality improvement (QI) coordinator discussed the quality improvement DNP project PICOT and requested site approval. A letter of support was submitted to SeMRHI and approved before initiating the data collection process. After meeting and defending the DNP project with the committee chair and members, an application was submitted to The University of Southern Mississippi Institutional Review Board (IRB) requesting approval of the scholarly project, "A Quality Improvement Project on Blood Pressure Methodology: Are We Failing Our Patients?" During the next several weeks of communicating with the IRB, modifications to the DNP project were completed per the IRB recommendations.

Context

When measuring and interpreting blood pressure measurement values, common mistakes occur daily not only in the FQHCs located in underserved and marginalized communities but in every medical facility that delivers patient care. According to Ray et al. (2011), we can determine that inaccurate blood pressure assessment is common and may impact hypertension treatment decisions. According to the research (Ogedegbe &

Pickering, 2010), we can determine that in a study performed at a teaching hospital, researchers discovered that not one out of 172 workers followed the American Heart Association guidelines for measuring blood pressure in the clinical setting. This DNP project will utilize current evidence-based guidelines and recommendations of the American Heart Association (AHA) and the American College of Cardiology (ACC) to collect data and present recommendations to SeMRHI and the FQHC staff on techniques and approaches essential in the proper diagnosis and management of hypertension.

Population

With a population greater than three hundred million people and 20% living in non-urban rural areas, it is becoming increasingly difficult for medical facilities in the United States to provide access to quality health care for every individual. The increasing population is creating a widening disparity between rural and underserved communities and residents of urban upper-class neighborhoods. resulting in higher mortality rates and unequal health equity related to manageable and preventable conditions such as hypertension. The FQHC, a community-based organization, assumed much of the burden of providing medical care within these marginalized communities and currently operates 336 centers in the state of Mississippi.

The FQHC selected to participate in the DNP project is demographically diverse. Approximately 53% of the community has a significant female population with women comprising 53.4% of the population. The latest US Census reports that the community is 55.5% Caucasian, and 37.7% African American, with various races completing the percentage. Fifty-six percent of the community is between 18-64 years old. Eighty-seven percent of the community reports owning a personal computer and 86.2% of residents

have received their high school diploma (U.S. Census Bureau QuickFacts: Picayune city, Mississippi, n.d.).

Setting

Data was compiled at a Southeast Mississippi Regional Health Initiative FQHC which provides medical services to a population that has limited access to primary care. The FQHC offers patients seeking healthcare and without health insurance the option to pay for services using an income-based sliding scale and is equipped to perform basic laboratory studies and point-of-care testing with more complex labs and other diagnostic testing performed at the regional medical center. The center receives patients Monday-Friday, 0800-1730 by appointment, and occasionally accepts walk-in patients when appropriate. There are eight personnel assigned to the FQHC: two Advanced Practice Nurse Practitioners, two Registered Nurses (RN), one Licensed Practical Nurse (LPN), and four ancillary staff. The center has two rooms which are identified and equipped as primary screening rooms. Blood pressure readings can also be obtained in the provider exam rooms. The two APRNs, the two RNs, and the LPN are responsible for obtaining blood pressure measurements and other vital sign measurements.

Intervention

The PICOT was briefed to the FQHC two APRNs and clinic manager and the SeMRHI Quality Improvement (QI) Officer. Questions and concerns were documented by the primary investigator and addressed before initiating the data collection process. The nursing staff were not informed of the DNP project due to the potential for bias when measuring blood pressure values which would have potentially produced inaccurate data. The data collection process began with the initial contact between the investigator and the

patient in the health center waiting room where the investigator explained the DNP project expectations preprinted script (Figure 1). Consent to participate was provided through verbal assent before leaving the patient's waiting area. The next step in the data collection process will involve the primary investigator observing and assessing the nurse-patient interaction from the waiting room. At this point, the nurse should ensure the patient has been sitting in a relaxed environment for a minimum of five minutes. As the encounter moves into the screening room, the investigator will observe the nurse placing the patient in a seated position with both feet flat on the ground. Criteria evaluation will continue by observing the nurse's selection of the correct size cuff and correctly placing the cuff on the patient's extremity. If the blood pressure reading is abnormal and another measurement is indicated, then another measurement will be obtained in the provider exam room where steps one through three will be reevaluated. The investigator will evaluate the nurse's blood pressure measurement technique utilizing comprehensive data collection tool criteria developed from guidelines and recommendations published by the American College of Cardiology and the American Heart Association (2019) (Figure 2). The expected outcome of the intervention was to ensure the APRN receives accurate blood pressure measurements which are used to guide the FNP's decision to diagnose hypertension, monitor the effects of hypertensive treatment, initiate statin therapy, and recommend pharmacological antihypertensive and other medications treatment.

Measures

Data collected from the measurement of blood pressure values was obtained utilizing a direct observation collection method by the primary investigator during normal clinic hours, 0800-1730 Monday-Friday from consenting patients requesting healthcare

from the Federally Qualified Health Center in south Mississippi over two weeks. Nursing personnel measured blood pressure values using an assigned oscillometer that was inspected and approved by SeMRHI. The primary investigator will observe and assess the nurse and patient interaction from the waiting room where the nurse should inquire on the length of time the patient has been sitting. As the encounter moves into the screening room the investigator will observe if the nurse ensures the patient is seated with both feet flat on the ground. Criteria evaluation will continue with the nurse selecting the correct size cuff and correct placement of the cuff. If the blood pressure reading is abnormal and another measurement is indicated, then steps one through three are evaluated in the exam room. The investigator evaluated the nurse's technique utilizing criteria developed from guidelines and recommendations of the American College of Cardiology and the American Heart Association (Figure 2). Findings and other observations were not discussed with the nursing staff until the data collection process was complete. This precaution would remove the potential for the nursing staff to modify their technique during the next patient encounter.

Analysis

The total cost/analysis of the DNP project was zero dollars. After completing the DNP project, data was analyzed and presented to SeMRHI and FQHC staff. The staff were briefed on the total number of blood pressure measurements, the number of blood pressure measurements using appropriate techniques, the number of measurements obtained with an incorrect technique, and the type of equipment used. Recommendations were presented to personnel focusing on proper blood pressure measurement techniques and appropriate educational advice for patients.

Ethical Considerations

After receiving approval from SeMRHI, the FQHC, and The University of Southern Mississippi Institutional Review Board (Protocol # 23-0667), DNP project implementation was initiated. Privacy and confidentiality were continually practiced during the data collection process and no participant identifying information was collected. All data pertinent to the DNP project was collected, compiled, reviewed, and stored at the facility in the Nurse Practitioner's office. Access to data was limited to the author. All data collected during the DNP project was destroyed after completion. A risk assessment was completed before collecting data and resulted in zero to minimal risk for all participants. Participation was voluntary and patients requesting exclusion from the DNP project were excluded from the process. The doctoral student continually respected the additional duties and responsibilities of the FQHC staff participating in the DNP project and valued their feedback and recommendations. Before initiating the data collection process, the researcher, Nurse Practitioner, and SeMRHI representative unanimously concurred there would be no disciplinary or adverse actions initiated against the nursing staff for their performance.

The DNP project recognizes the significant impact of the American Nurses Association (ANA) Code of Ethics provision five which states, "The nurse owes the same duties to self as to others, including the responsibility to promote health and safety, preserve wholeness of character and integrity, maintain competence, and continue personal and professional growth" (ANA, 2018, p. 19).

Summary

The objective of the quality improvement DNP project was to determine if the blood pressure measurement techniques of the FQHC nursing staff resulted in significantly different blood pressure measurements than those obtained by clinic personnel who followed recommendations of the American Heart Association (2019) and the American College of Cardiology. focused on improving the assessment techniques of the FQHC nursing staff while measuring blood After collecting all pertinent data, a review was completed focusing on improving SeMRHI policies and procedures and patient care related to hypertension management and diagnosis in FQHCs. The DNP project would not have been a success without the approval of the IRB and SeMRHI, the FQHC allowing clinic access, a willing patient population, and a cooperative nursing staff.

CHAPTER III – RESULTS

After the review and approval process conducted by The University of Southern Mississippi Institutional Review Board was completed, data was collected daily in a rural outpatient health center over two weeks. The researcher sought to recruit participants with a diverse demographic background of participants who would adequately represent the community. Forty-one participants were identified as eligible to participate in the DNP project. Participant approval was obtained after providing the prospective participants with a consent form, a thorough explanation of the DNP project, and answers to any questions or concerns they may have had. During the two-week data collection process, the DNP student did not encounter barriers or objections from the research participants. The researcher identified one modification that became necessary during the process. Several participants required additional time to comprehend the survey questions. This extra time may have been related to either a physiological or psychosocial barrier which the participant failed to disclose at the beginning of the survey.

Results

A total of 41 participants were recruited and asked to provide feedback about the techniques and procedures used to measure their blood pressure during their clinical visit. The table below illustrates the questions and techniques used during the blood pressure screening. These questions were posed to the study participants seeking their input on whether the nurse ensured the steps were performed.

Table 1

DNP Project Results

Topic	Response Yes	Response No	Percentage Yes/No
If you are prescribed blood pressure medication, did you take your medicine at least 1 hour prior to your appointment?	30	11	Yes- 73.1% No- 26.9%
Have you recently (<1 hr) consumed any caffeinated products (coffee, carbonated beverages, energy drinks) before your appointment today?	2	39	Yes- 4.9% No- 95.1%
Before your blood pressure was taken, were you sitting quietly with both feet flat on the ground for at least 5 minutes?	41	41	Yes- 100% No- 0%
When the nurse was taking your blood pressure, were you seated with both feet flat on the ground?	41	41	Yes- 100% No- 0%
If you were told your blood pressure was high, during the second measurement did the nurse use a stethoscope to measure your blood pressure?	27	0	Yes- 100% No- 0%

After the data collection process, the DNP student ensured that each participant answered all five items without coercion from the clinic staff, the researcher, or environmental influences. During all 41 patient encounters, the nursing staff ensured each

patient was positioned properly in a sitting position with their feet flat on the ground. The nursing staff also ensured in 100% of encounters, that if a second blood pressure reading was required, a manual blood pressure was performed to obtain the second reading. The DNP project results identified that approximately 27% of patients failed to take their medication before their medical appointments. Additionally, the DNP project identified that approximately 5% of patients contributed to an unreliable blood pressure measurement by consuming a caffeinated product prior to their appointment.

Summary

Chapter III presented a summary of results obtained from client responses to the five-item questionnaire after their clinical visit referencing blood pressure measurement. The questionnaire exceeded the research expectations in determining if blood pressure values were being measured correctly by nursing personnel in the rural outpatient health center. Chapter IV will explore and discuss lessons learned from the DNP project, strengths and weaknesses of the DNP project, measures to increase awareness and education in the community, and finally the impact on clinical practice in the rural community health center.

CHAPTER IV – DISCUSSION

Summary

This DNP project was developed because the research identified a need to review the accuracy of blood pressure measurements during patient encounters. The DNP student had noticed a need for this after completing clinical rotations in various rural community health centers throughout the Mississippi Gulf Coast. The primary investigator (PI), the DNP student, selected five common factors that occurred during each visit. These five commonly identified factors were presented in a patient survey questionnaire which, after approval by the USM IRB, 41 participants were surveyed following their blood pressure measurement. The five common factors included in the survey were:

- Non-compliance when self-administrating hypertensive medication before clinical visit.
- Inappropriate consumption of caffeinated products before a clinical visit.
- Inadequate time resting with feet flat on the ground prior to blood pressure measurement.
- Improper positioning when blood pressure is being obtained.
- Failure of clinic staff to utilize manual blood pressure technique to confirm an elevated value.

Although this sample size was small when compared to other blood pressure measurement studies previously reviewed for this DNP project, similarities were identified when comparing the results. Of the five commonly identified factors, the factor with the highest percentage of non-compliance was the lack of patient awareness and

education about appropriate timing in taking anti-hypertensive medication before the clinical appointment. This same non-compliant behavior was exhibited when patients were surveyed about consuming caffeinated beverages which could affect their blood pressure reading prior to their appointment.

Strengths identified by the primary investigator (PI) included the nursing staff's overall knowledge and technique when obtaining blood pressure measurements in the clinical setting. During all 41 patient encounters, nursing staff correctly positioned the patient and appropriately measured blood pressure manually if they discovered an elevated initial reading.

The framework model most appropriate for this DNP project was King's theory of goal attainment. This selection was because this theory focuses on the nurse-to-patient relationship, goal setting, and actions required to meet the decided-upon goals. Effective use of the five factors in the survey format and immediate feedback concerning issues that affect blood pressure measurement informed the PI, clinical staff, and SeMRHI leadership on which areas to focus on when developing a plan of action.

Lessons for the Future

The PI encountered 14 patients 70 years old or older who needed additional time when completing the survey. This additional time impacted the timely completion of subsequent surveys. For future research opportunities, the DNP student recommends narrowing the recruitment criteria to individuals between the ages of 18-60 years old. Available clinical resources are limited in methods and actions a patient can take to improve their awareness, and education and ultimately take charge of their medical care.

A possible resolution to this issue would be to create a list of websites that would be made available to the patient after the visit. Additionally, SeMRHI has a closed-circuit television channel strategically positioned throughout the health center broadcasting public service announcements (PSA) concerning patient health issues. The DNP student proposes adding an announcement concerning proper self-administration of anti-hypertensive medications and other appropriate medications as well as factors that may affect blood pressure values.

Implications for Future Practice

The results of the DNP project were presented to clinical staff and SeMRHI administrative leadership in an executive summary document with the expectation that the accumulated data could be integrated into clinical practice. This action would ensure greater accuracy in recording and reporting blood pressure measurements to the clinician before they initially diagnose a client, modify a medication, or initiate a referral for specialty care. Additionally, many patients who the researcher encountered during the clinical day measure their blood pressure at home with an OT blood pressure measurement device. Appropriate and current information must reach these patients to ensure they are not recording inaccurate readings and then reporting these numbers to the clinician.

Conclusion

The purpose of the DNP project was to further investigate and provide recommendations about identified factors that may affect obtaining blood pressure in a rural community health center. Hypertension is one of the leading causes of stroke and cardiovascular disease in the United States today. As clinical professionals, we owe our

patients the belief that we are technically and tactically proficient at our job and that each time they arrive for an appointment, they receive the best care in the world today. Further research is needed on this issue and the DNP student hopes that this investigation and the recorded data will prove useful to future researchers who also seek to improve blood pressure measurements not only in the rural community health center but throughout all clinical settings and other locations where blood pressure measurements are obtained.

APPENDIX A – Letter of Support

SOUTHEAST MISSISSIPPI RURAL HEALTH INITIATIVE, INC.

[redacted]

Date: 16 June, 2023

RE: Letter of Support for Michael W Baker, RN

Attn: Facility Nursing Research Council Application Process-DNP BSN-DNP Student

To: Nursing Research Council Chair and Committee

This letter is in support of Michael W Baker BSN, RN for application and approval of his Clinical Doctoral Project. The focus and title of this evidenced-based project is "A Quality Improvement Project on Blood Pressure Methodology: Are We Failing Our Patients." The site will be a family health center located within the Southeast Mississippi Regional Health Initiative (SEMRHI). Network.

I have discussed this topic with Michael W Baker and support and recommend the need for education and increased awareness about blood pressure measurement technique. I understand that all assessments of blood pressure measurement techniques will be conducted over a two-week period ensuring that all appropriate HIPAA and SEMRHI regulations are adhered to in order to safeguard all personal and sensitive patient data.

I understand that following approval by the Nursing Research Council, he will seek approval from the to The University of Southern Mississippi Institutional Review Board (IRB) for final approval of his Clinical Doctoral Project proposal. At present, I understand that Michael W Baker is a full-time BSN-DNP (Family Nurse Practitioner) student in the Doctor of Nursing Practice Program at the University of Southern Mississippi, Hattiesburg campus.

I, Janice Robinson, CEO, SeMRHI, located at 5488 U.S. Hwy 49, Hattiesburg, MS. 39401 am offering this letter of support of the doctoral student, Michael W Baker, in his doctoral project as titled above and look forward to hearing his findings. I understand the planned dates are 30 days from USM IRB approval is received. I understand that letter of support will be included in the University of Southern Mississippi Institutional Review Board (IRB) application.

His Chair contact information is Dr. Lisa Morgan, DNP, FNP-BC lisa.morgan@usm.edu Phone# (601) 266-6087.

The Nurse Practitioner at the proposed site, Stephanie Lumpkin-Freeman, fully supports Michael W. Baker's efforts to achieve his academic endeavor in this clinical practice project. We look forward to hearing the results of this study and the implications on clinical practice.

If there is any other information you should need, please do not hesitate to contact me.

Sincerely,

[redacted]

"COMMITTED TO QUALITY RURAL HEALTH CARE"

Equal Opportunity Service Provider

APPENDIX B – Nursing Staff Algorithm

1. Has the patient been in a quiet environment and sitting > 5min?

YES NO

↓ ↓ Place the patient sitting with feet on a quite flat surface.

↓ Proceed to question 2.

↓

2. Does the patient have a full bladder?

YES NO

↓ Instruct patient to empty bladder and return to the screening room.

↓ Proceed to question 3.

↓

3. Is the patient experiencing pain or distress?

YES NO

↓ Determine pain level on a scale of 1-10 and document findings.

4. Has it been a minimum of 2 hours since taking antihypertensive medication?

YES NO

↓ ↓ Document findings

5. Does the patient experience “white coat hypertension?”

YES NO

↓ Document findings ↓

6. Is the patient aware of their normal blood pressure?

YES NO

↓ Document findings ↓

7. Recent use of tobacco or caffeine products?

YES NO

↓ Document findings ↓

8. Recent consumption of meals high in sodium?

YES NO

↓ Document findings ↓

9. Is the selected arm uncovered and free of tight-fitting clothing?

YES NO

↓ ↓→Fully uncovered arm

APPENDIX C – Evaluator Checklist

Has the nursing staff ensured patient has been sitting in a quiet environment > 5min? Y N

Comments:

Did the nurse inquire about recent tobacco use? Y N

Comments:

Was the patient asked what their normal blood pressure reading was? Y N

Comments:

Did the nurse ensure the patient had an empty bladder? Y N

Comments:

Inspect the extremity for any abnormalities (fistulas, IVs, pain, or tenderness) Y N

Comments:

Was the patient placed in a sitting position with both feet on a flat surface? Y N

Comments:

Select the proper cuff size? Y N

Comments:

Properly place cuff? Y N

Comments:

Was the arm placed near or above the level of the heart? Y N

Comments:

APPENDIX D – Patient Instructional Handout

You are measuring your blood pressure at home so you and your provider can better manage your blood pressure. Before using your machine at home, we recommend you bring the machine into the clinic and demonstrate to the nurse or your provider how you will use the machine. We also recommend you periodically bring your blood pressure machine to your appointment so it can be inspected by a healthcare professional. When measuring your blood pressure at home, follow the steps below to ensure you are collecting accurate numbers to provide your doctor with at a later date.

- Make sure it has been at least one hour since you took your blood pressure medicine.
- Make sure you have an empty bladder.
- 30 minutes before measuring your blood pressure, no caffeine, smoking, or exercise.
- Five minutes before measuring your blood pressure make sure you have been sitting in a quiet environment with both feet on a flat surface.
- Make sure you are checking your blood pressure in the same arm.
- Make sure the selected arm is uncovered or free of tight-fitting clothing.
- Make sure your cuffed arm is on a flat surface and at heart level.
- During the blood pressure measurement, you should not be talking.

APPENDIX E – Clinical Staff Instructional Handout

Regardless of the method or the individual assessing blood pressure values, accuracy relies on standardized techniques and appropriate observer training. There are a variety of factors which may influence errors in measurement. These factors include:

Source	Example
Patient-related	Movement, medication non-compliance, caffeine consumption, full bladder, stress, pain, anxiety, urge for bowel movement, tobacco use, alcohol use
Device-related	Expired/overdue calibration, inoperative/faulty device
Procedure-related	Obtaining information during blood pressure measurement, incorrect cuff selection, incorrect placement of cuff, placing patients in an incorrect position

APPENDIX F – IRB Approval Letter

Office of Research Integrity

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

118 COLLEGE DRIVE #5116 • HATTIESBURG, MS | 601.266.6756 | WWW.USM.EDU/ORI

NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI using the Incident form available in InfoEd.
- The period of approval is twelve months. If a project will exceed twelve months, a request should be submitted to ORI using the Renewal form available in InfoEd prior to the expiration date.

PROTOCOL NUMBER:	23-0667
PROJECT TITLE:	A Quality Improvement Project on Blood Pressure Measurement: Are We Failing Our Patients?
SCHOOL/PROGRAM	Leadership & Advanced Nursing
RESEARCHERS:	PI: Michael Baker Investigators: Baker, Michael~Morgan, Lisa~
IRB COMMITTEE ACTION:	Approved
CATEGORY:	Expedited Category
PERIOD OF APPROVAL:	17-Aug-2023 to 16-Aug-2024

Lisa Wright

Lisa Wright, Ph.D., MPH
Senior Institutional Review Board Analyst

APPENDIX G – Executive Summary

A Quality Improvement on Blood Pressure Measurement: Are We Failing Our Patients?

by Michael William Baker

Introduction

Without regard to race, gender, background, or socioeconomic level, this "silent killer" the Mississippi State Department of Health estimated that over 700,000 Mississippi adults were diagnosed with high blood pressure and thousands more at an increased risk each year (Mississippi State Department of Health, Home, n.d.). Failure to identify and effectively manage high blood pressure is a significant contributing factor in these deaths.

Purpose and Objective

The purpose of this DNP project was to improve blood pressure measurement techniques in the FQHC. After receiving approval from SeMRHI and The University of Southern Mississippi Institutional Review Board (Protocol # 23-0667), data was collected utilizing a direct observation collection method by the primary investigator during normal clinic hours, 0800-1730 Monday-Friday from consenting patients requesting healthcare from the Federally Qualified Health Center in south Mississippi over a two-week period.

Results

Five commonly identified factors were presented in a patient survey questionnaire.

- Took anti-hypertensive medication >1 hour before clinical visit. (73% responded yes)

- Consumed caffeinated products <1 hour before the clinical visit. (95% responded no)
- Failed to sit in a quiet environment prior to blood pressure measurement. (100% yes)
- Placed in an improper position when blood pressure was being obtained. (100% yes)
- Utilized manual blood pressure technique to confirm an elevated value. (100% yes)

Recommendations

Educational handouts and educational material broadcast on the clinic closed circuit television will discuss ensuring appropriate anti-hypertensive medication are prescribed, and appropriated patient education is provided on proper technique when obtaining a blood pressure measurement. These resources will also benefit by reducing the percentage of rural community residents diagnosed with high blood pressure, will increase awareness, and will enhance health equity throughout rural communities in Mississippi.

Limitations

The PI encountered 14 patients 70 years old or older who needed additional time when completing the survey. This additional time impacted the timely completion of subsequent surveys. For future research opportunities, the DNP student recommends narrowing the recruitment criteria to individuals between the ages of 18-60 years old.

Conclusions

Further research is needed on this issue and the DNP student hopes that this investigation and the recorded data will prove useful to future researchers who also seek to improve blood pressure measurements not only in the rural community health center but throughout all clinical settings and other locations where blood pressure measurements are obtained.

Reference

Mississippi State Department of Health, Home. (n.d.). https://msdh.ms.gov/

REFERENCES

2021 Annual Report. (2022). *America's Health Rankings*. United Health Foundation. https://www.americashealthrankings.org/learn/reports/2021-annual- report.

Abu Baker Sheikh, Sobotka, P. A., Garg, I., Dunn, J., Mannan, A., Hasan, M., Jeroen Molinger, McDonnell, B. J., & Marat Fudim. (2023). Blood pressure variability in clinical practice: *Past, Present, and the Future*. *12*(9). https://doi.org/10.1161/jaha.122.029297

American Association of Colleges of Nursing (AACN). (2006). *The Essentials of Doctoral Education for Advanced Nursing Practice*. www.aacnursing.org.

American Heart Association (AHA). (2019). *High blood pressure*. American Heart Association. https://www.heart.org/en/health-topics/high-blood-pressure

American Nurses Association (ANA). (2018). *American Nurses Association.* ANA. https://www.nursingworld.org/ana/

Are blood pressure measurement mistakes making you chronically ill? (n.d.). www.heart.org. https://www.heart.org/en/news/2018/05/10/are-blood-pressure measurement-mistakes-making-you-chronically-ill.

Berg, S. (2019, June 13). 4 big ways BP measurement goes wrong, and how to tackle them. *American Medical Association*. https://www.ama-assn.org/delivering-care/hypertension/4-big-ways-bpmeasurement-goes-wrong-and-how-tackle-them

Blood Pressure Assessment: JACC Expert Panel Report. (n.d.). American College of Cardiology. https://www.acc.org/latest-in-cardiology/ten-points-to-remember/2019/01/23/14/55/blood-pressure-assessment-in-adults-in-clinical

Burns, N., & Grove, S. (2015). *Understanding nursing research: Building an evidence-based practice*. Elsevier.

Butler, M.J., Tanner, R.M., Muntner, P., Shimbo, D., & Bress, A.P. (2017). Adherence to antihypertensive medications and associations with blood pressure among African Americans with hypertension in the Jackson heart study. *Journal of the American Society of Hypertension*, *11*(9), 581-588.e5.https://doi.org/10.1016/j.jash.2017.06.011

Center for Disease Control (CDC). (2021). *Facts about hypertension*. (2021). https://www.cdc.gov/bloodpressure/facts

Chism, L.A. (2013). *The Doctor of Nursing Practice: A guidebook for role development and professional issues.* (2nd ed.). Jones & Bartlett Learning.

Cohen, J.B. (2020). Masked hypertension. *Hypertension, 76*(4), 1079-1080. https://doi.org/10.1161/hypertensionaha.120.15859

Comparing Health Equity, SDoH Indices, & RTI Health Advance. (n.d.). Healthcare.rti.org. https://healthcare.rti.org/insights/comparing-health-equity-and-sdoh-indices

Experts Stress the Importance of Accurate Blood Pressure Screenings. (n.d.). CardioSmart. https://www.cardiosmart.org/news/2019/1/experts-stress-importance-of-accurate-blood-pressure-screenings

Khatib, R., Schwalm, J.-D., Yusuf, S., Haynes, R. B., McKee, M., Khan, M., & Nieuwlaat, R. (2014). Patient and healthcare provider barriers to hypertension awareness, treatment and follow up: A Systematic review and meta-analysis of

qualitative and quantitative studies. *PLoS ONE*, *9*(1), e84238. https://doi.org/10.1371/journal.pone.0084238

King, I.M. (1981). *A theory of goal attainment: General concepts of human behavior.* John Wiley & Sons.

Lamees El-Sadek, M., Lei Zhang, R., Vargas, T., Funchess, C., & Green, M. (2015). R *Mississippi Health Disparities and Inequalities report the Office of Health Disparity Elimination and the Office of Health Data & Research*. Mississippi State Department of Health, Jackson, MS.

Mamaghani, E.A., Hasanpoor, E., Maghsoodi, E., & Soleimani, F. (2020). Barriers to medication adherence among hypertensive patients in deprived rural areas. *Ethiopian Journal of Health Sciences*, *30*(1), 85-94. https://doi.org/10.4314/ejhs.v30i1.11

Mississippi Department of Health (MSDH). (2021). Heart disease and stroke prevention program. (2021). https://www.msdh.gov/msdhsite/_stat

Miyong, K.T., Hill, M.N., Bone, L.R., & Levine, D.M. (2000). Development and testing of the hill-bone compliance to high blood pressure therapy scale. *Progress in Cardiovascular Nursing,* 15, 90-96. https://www.ncbi.nlm.nih.gov/m/pubmed/10951950

Moran, K., Burson, R., & Conrad, D. (2020). *The Doctor of nursing practice project: A framework for success.* (3rd ed.). Jones and Bartlett Learning.

Muntner, P., Shimbo, D., Carey, R. M., Charleston, J. B., Gaillard, T., Misra, S., Myers, M. G., Ogedegbe, G., Schwartz, J. E., Townsend, R. R., Urbina, E. M., Viera, A. J., White, W. B., & Wright, J. T. (2019). Measurement of blood pressure in

humans: A Scientific statement from the American Heart Association. *Hypertension, 73*(5). https://doi.org/10.1161/hyp.0000000000000087

New Guidance on Blood Pressure Management in Low-Risk Adults with Stage Hypertension. (n.d.). American College of Cardiology. https://www.acc.org/latest-in-cardiology/articles/2021/06/21/13/05/new-guidance-on-bp-management-in-low-risk-adults-with-stage-1-htn

Ogedegbe, G., & Pickering, T. (2010). Principles and Techniques of Blood Pressure Measurement. *Cardiology Clinics*, *28*(4), 571–586. https://doi.org/10.1016/j.ccl.2010.07.006

Pettey, C.M., McSweeney, J.C., Stewart, K.E., Cleves, M.A., Price, E.T., Heo, S., & Souder, E. (2016). African Americans' perceptions of adherence to Medications and lifestyle changes prescribed to treat hypertension. SAGE open, 6(1), https://doi.org/10.1177/2158244015623595 Report Finds Widespread Health Inequities in the United States. (n.d.). www.aafp.org.https://www.aafp.org/news/health-of-the-public/20211223inequityreport.html

Ray, G. M., Nawarskas, J. J., & Anderson, J. R. (2011). Blood Pressure Monitoring Technique Impacts Hypertension Treatment. *Journal of General Internal Medicine*, *27*(6), 623–629. https://doi.org/10.1007/s11606-011-1937-9

Rural Health for Mississippi Introduction - Rural Health Information Hub. (n.d.). https://www.ruralhealthinfo.org/states/mississippi

Schultz, W.M., Kelli, H.M., Usko, J.C., Varghese, T., Shen, J., Sandesara, P., Quyyumi, A.A., Taylor, H.A., Gulati, M., Harold, J.G., Mierres, J.H., Ferdinand, K.D.,

Mensah, G.A., & Sperling, L.S. (2018). Socioeconomic status and cardiovascular outcomes: *Challenges and Interventions*, *137*(20), 2166-2178. https://doi.org/CIRCULATIONAHA.117.

Shimbo, D., Artinian, N. T., Basile, J. N., Krakoff, L. R., Margolis, K. L., Rakotz, M. K., & Wozniak, G. (2020). Self-measured blood pressure monitoring at home: A joint policy statement from the American Heart Association and American Medical Association. *Circulation, 142*(4). https://doi.org/10.1161/cir.0000000000000803

Smith, L. (2005). New AHA Recommendations for blood pressure measurement. *American Family Physician, 72*(7), 1391-1398. https://www.aafp.org/pubs/afp/issues/2005/1001/p1391. html#:~ text=The%20 position%20of%20the%20patient%20can%20have %20a

Southeast Mississippi Regional Health Initiative. https://semrhi.org/The Statistics Portal. (n.d.) *Statista*. https://www.statista.com/

U.S. Census Bureau (n.d.) *QuickFacts: Picayune City, Mississippi*. www.census.gov. https://www.census.gov/quickfacts/fact/table/picayunecitymississippi/SBO060217

Wood, F. (2005). Health literacy in a rural clinic. *Online Journal of Rural Nursing and Health Care*, *5*(1), 9–18. https://doi.org/10.14574/ojrnhcv5i1.187

Woodrow, E., & Blvd, W. (2015). OHDE Annual Health Disparities and Inequalities Report State of the State: Annual Mississippi Report OHDE Annual Health Disparities and Inequalities Report. https://msdh.ms.gov/page/resources/6414.pdf

Zaccagnini, M. E., & White, K. (2014). *The Doctor of Nursing practice essential: a new model for advanced practice nursing.* Jones & Bartlett Learning.

Zoellner, J., Thomson, J.L., Landry, A.S., Anderson-Lewis, C., Connell, C., Molaison, E.F., & Yadrick, K. (2010). Improvements in blood pressure among undiagnosed hypertensive participants in a community-based lifestyle intervention, Mississippi, 2010. *Preventing Chronic Disease*, 11, 130269. http://dx.doi.org/10.5888/pcd11.130269