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## Implementation Of The Eighth Joint National Committee Guidelines Of Hypertension By The Primary Care Provider

Emily J. Stidham

Meagan Z. Hillhouse

Haley J. Murphy

Shelly R. Parker

Elaina A. Ponder

*See next page for additional authors*

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**Author**

Emily J. Stidham, Meagan Z. Hillhouse, Haley J. Murphy, Shelly R. Parker, Elaina A. Ponder, and Lauren A. Tutor

IMPLEMENTATION OF THE EIGHTH JOINT NATIONAL COMMITTEE GUIDELINES OF  
HYPERTENSION BY THE PRIMARY CARE PROVIDER

By

Emily J. Stidham

Meagan Z. Hillhouse

Haley J. Murphy

Shelly R. Parker

Elaina A. Ponder

Lauren A. Tutor

A Clinical Research Project  
Master of Science in Nursing, College of Nursing  
and Health Sciences  
Mississippi University for Women  
Columbus, Mississippi

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Graduate Committee Approval

The Graduate Committee of

Emily J. Stidham, Meagan Z. Hillhouse, Haley J. Murphy,

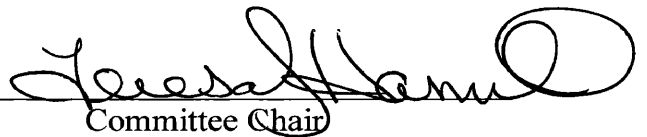
Shelly R. Parker, Elaina A. Ponder, and Lauren A. Tutor

hereby approves their research project as meeting

partial fulfillment of the requirements for the

Degree of Master of Science in Nursing

Approved:

  
Committee Chair

Approved:

  
Committee Member

Approved:

  
Committee Member

Approved:



Director of Graduate Studies

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## **DEDICATION**

The team members wish to recognize their loved ones for their patience, reassurance, and sentiment throughout the graduate program and research process. The completion of this research project signifies completion of nurse practitioner school and the beginning of a new career. We cannot fully express how grateful we are for the support provided by our friends and families. We thank you for the many sacrifices made while we have pursued our dreams. We are eternally grateful and will strive to utilize the knowledge and skills we have acquired to instill God's grace in our patients.

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Emily J. Stidham

Meagan Z. Hillhouse

Haley J. Murphy

Shelly R. Parker

Elaina A. Ponder

Lauren A. Tutor

Mississippi University for Women, 2018

Supervising Faculty: Teresa Hamill, DNP, FNP-BC

**Abstract**

Hypertension is a widespread disease process and well-known risk factor for coronary artery disease, stroke, heart failure, and renal failure. Proper diagnosis and treatment of hypertension is crucial to reducing these adverse patient outcomes. The Eighth Joint National Committee (JNC 8) released their most recent guidelines of the diagnosis and management of hypertension in December 2013 with implementation to take effect in January 2014. The JNC 8 guidelines of hypertension include the following: proper diagnosis of hypertension ( $>140/90$  for patients  $< 60$  years of age and those with diabetes and/or chronic kidney disease and  $>150/90$  in patients  $\geq 60$  years of age), lifestyle modifications to be initiated with every hypertensive patient, and newly diagnosed hypertensive patients should follow-up one-month after initial diagnosis and treatment. It is important for primary care providers to abide by these recommendations because of the evidence-based research behind the guidelines released by the Eighth Joint

National Committee. This study is significant to education, nursing, and further research because of the prevalence of hypertension.

This study was a quantitative, retrospective chart review that analyzed electronic medical records of adult patients newly diagnosed with hypertension with or without diabetes and/or chronic kidney disease. Following approval by the Institutional Review Board (IRB), a standardized data collection tool and legend was used to collect information such as: age, gender, race/ethnicity, blood pressure classification according to the JNC 8 guidelines, diagnosed comorbidities of diabetes and/or chronic kidney disease, pharmacologic management of hypertension, one-month follow-up with the primary care provider, documented need of lifestyle modifications, type of primary care provider and insurance of the patient. A total of 328 patients' charts met the researchers' criteria of 18 years of age or older and newly diagnosed with hypertension after January 1, 2014 for inclusion in the study. After compiling the data, the researchers determined the majority of primary care providers do follow the JNC 8 guidelines to diagnose and treat hypertension. Also, in congruence with the JNC 8 guidelines, pharmacological therapy was initiated for each patient diagnosed with hypertension. There was significant statistical difference in recommendation of lifestyle modifications in patients with comorbidities, and diet modifications was the most common lifestyle modification utilized by primary care providers. While primary care providers are likely to follow the JNC 8 guidelines in diagnosing and initiating pharmacological treatment in hypertensive patients, this study concluded that primary care providers do not educate on all recommended lifestyle modifications of the JNC 8 guidelines which include healthy diet, weight control, regular exercise, and smoking cessation.

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## CHAPTER I

### Introduction to the Problem

One of every three American adults—approximately 77.9 million—has hypertension. In 2013, forty-seven percent of those with high blood pressure did not have it controlled (Go AS et al., 2013). More deaths in the United States can be contributed to high blood pressure than any other risk factor. Hypertension costs the nation an estimated \$47.5 billion each year and is a major independent risk factor for coronary artery disease, stroke, heart failure, and renal failure. These risks are increased when hypertension is not detected early or treated appropriately (Hernandez-Vila, 2015). It is projected that by 2030 the prevalence of hypertension will increase 7.2 percent from 2013 estimates (Go AS et al., 2013).

In 1973, the National High Blood Pressure Education Program of the National Heart, Lung, and Blood Institute met with the goal of providing a set of practical recommendations for identifying population statistics for those with hypertension. This group sought to determine those who could benefit from antihypertensive therapy, and proposed appropriate treatment regimens. After data was collected for three years, the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure used this data to simplify the recommendations for diagnosis and treatment of high blood pressure in 1977 ("Report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure. A cooperative study," 1977). The Joint National Committee has updated high blood pressure recommendations eight times since 1977, and the most recent recommendations (see Appendix A) were published in December 2013 by the Eighth Joint National Committee (JNC 8) (Joseph et al., 2015).

There have been many alterations and improvements of the JNC guidelines according to evidence-based research over the years; however, the changes between the JNC 7 and JNC 8 guidelines of hypertension were significant. The JNC 7 guidelines defined blood pressure as normal, prehypertensive, stage one hypertensive, and stage two hypertensive, whereas, JNC 8 only classifies high blood pressure as normal or hypertensive. For the JNC 7 guidelines, normal blood pressure was less than 120/80 mmHg, prehypertension was 120-139/80-89 mmHg, stage one hypertension was 140-159/90-99 mmHg, and stage two hypertension was  $\geq 160/100$  mmHg. The JNC 8 guidelines have a blood pressure goal of less than 140/90 mmHg for patients under the age of 60 or with comorbidities of diabetes mellitus (DM) and/or chronic kidney disease (CKD). Patients 60 years of age or older, who do not have DM or CKD, should have a blood pressure less than 150/90 mmHg according to the JNC 8 guidelines. Differing from the JNC 8 guidelines, the JNC 7 guidelines did not include comorbidities of DM or CKD when diagnosing hypertension. Another difference between the JNC 7 and JNC 8 guidelines were the number of medication classes recommended to treat hypertension. Unlike the JNC 7 guidelines, which used five classes of medication as first line treatment, the JNC 8 guidelines have now limited first line treatment to four classes of medications which include: thiazide diuretics, Calcium Channel Blockers (CCBs), Angiotensin Converting Enzyme inhibitors (ACEI), and Angiotensin Receptor Blockers (ARB) (Page, 2014).

### **Problem Statement**

Hypertension is a well-known condition found in primary care. The normal blood pressure of the body results from the force at which the blood is being pushed against the walls of the arteries forward throughout the body. When that force is too high, as in high blood pressure or hypertension, several negative affects happen within the human body. After a period



of continuous high pressure, small tears result in the lining of arteries. This damage leads to plaque accumulation within the artery walls, resulting in stenosis, a condition that hardens and narrows the arteries. Because of stenosis, the body's blood pressure will continue to rise resulting in hypertension and other significant damages, such as cardiac disease, renal disease, stroke, diabetes, and even death (American Heart Association, 2017).

The Eighth Joint National Committee distributed guidelines for primary care providers to treat adult hypertensive patients with the goal of blood pressure control and the reduction of medication needs (James et al., 2013). The JNC 8 guidelines include the diagnosis of hypertension and recommendations for pharmacologic and nonpharmacologic management of hypertension as well as patient follow-up. The JNC 8 guidelines recommend diagnosing hypertension for those aged 18 to 59 with blood pressure readings of 140/90 or higher and for those aged 60 and above with blood pressure readings of 150/90 or higher. According to the JNC 8 guidelines, those with a diagnosis of DM or CKD should be diagnosed with hypertension if blood pressure readings are 140/90 or higher for all adult patients, regardless of age. In addition to the diagnosis recommendations, the JNC 8 guidelines suggest lifestyle modifications, pharmacologic treatment, and one-month follow-up for patients diagnosed with hypertension. JNC 8 defines lifestyle modifications as a healthy diet, regular exercise, weight control, and smoking cessation, and these modifications should be initiated with diagnosis and maintained continuously throughout hypertensive treatment. JNC 8 believes adherence to lifestyle modifications can reduce the need for antihypertensive medications (James et al., 2013). If antihypertensive medications are necessary, pharmacologic treatment according to the JNC 8 guidelines include antihypertensive medications classes of thiazide diuretics, CCBs, ACEI, and ARBs. The JNC 8 guidelines also recommend the target dose of medication therapy and the

number of medication doses per day. The antihypertensive medication class is chosen by the patient's race and comorbidities if present. Lastly, the JNC 8 guidelines recommend a follow-up appointment within one-month for patients newly diagnosed with hypertension. The purpose of the one-month follow-up appointment is to assess the management of hypertension and if the patient's blood pressure reading is at the goal of less than 140/90 mmHg for patients with DM and/or CKD and all patients under the age of 60 or less than 150/90 mmHg for patients 60 years of age and older (James et al., 2013).

In all, there are nine recommendations of the JNC 8 guidelines of hypertension. Recommendations one through eight discuss diagnosing hypertension and initiating pharmacologic therapy. Recommendation seven is specific to the type of antihypertensive treatment for the African-American race, including those with diabetes. A thiazide-type diuretic or calcium channel blocker is recommended for this population. Recommendation eight states patients 18 and above, regardless of race, with CKD should receive an ACEI or ARB in combination with another antihypertensive medication or used alone to protect the function of the kidneys. Recommendation nine discusses the need for newly diagnosed hypertensive patients to follow-up within one-month to determine if the hypertension is well managed. If the blood pressure is not within normal limits at the one-month follow-up appointment, antihypertensive therapy should be initiated, increased, or changed at that time (James et al., 2013).

For this study, the main focuses from the nine recommendations were the diagnosis of hypertension according to the JNC 8 guidelines, the initiation of lifestyle modifications and/or pharmacologic therapy, and the documentation of one-month follow-up for patients newly diagnosed with hypertension.

## **Significance of Study**

This study is significant to primary care providers as well as nursing, clinical practice, education, and research because of the prevalence of hypertension.

### **Nursing and Clinical Practice**

From a nursing perspective, all personnel from licensed practical nurses to advanced practice registered nurses, take care of patients who are diagnosed with hypertension. It is essential to discuss with patients the severity of hypertension as well as interventions that would prevent bad outcomes of hypertension such as lifestyle modifications of healthy diet, regular exercise, weight loss, and smoking cessation as suggested by the JNC 8 guidelines. Discussing these aspects of the patients' care increases their knowledge on the subject matter, leading to an understanding of hypertension and the desire to comply with treatment. Nurses could improve patient compliance with antihypertensive medications by educating them on the pathophysiology and significance of the medication by the way it targets high blood pressure. Medication side effects should also be discussed by the nurses with patients, and the patients should be encouraged to report them to their primary care provider. This would lead to increased patient compliance of antihypertensive therapy and an overall reduction of poor patient outcomes from hypertension.

In regards to nursing on the provider level, hypertension is a diagnosis that nurse practitioners routinely diagnose, treat, and manage in clinical practice. The JNC 8 guidelines provide the nurse practitioner with a detailed, step-by-step approach to simplify diagnosing and treating patients with hypertension as well as patients with dual diagnoses of hypertension with DM and/or CKD. The JNC 8 guidelines give nurse practitioners and other primary care providers the resources needed to effectively manage patients with hypertension.

## **Education**

This study is also significant to education in many different aspects. The JNC 8 guidelines were released in December of 2013; therefore, many primary care providers were unaware of the new changes for diagnosing and treating hypertension. This study helped educate those primary care providers who were unaware of the new guidelines by providing data on the new JNC 8 guidelines for hypertension. Also, some primary care providers were knowledgeable of the JNC 8 guidelines but were unaware of the differences between the JNC 7 and JNC 8 guidelines. This study provided an opportunity for education with many primary care providers regarding hypertension guidelines and what JNC 8 recommends when managing hypertensive patients. The results of this study were made available to educators, so they could share it with employees, students, patients, and others. This study also provided information of lifestyle modifications such as healthy diet, regular exercise, weight control, and smoking cessation, as included in the JNC 8 guidelines of hypertension, making patients more involved in their own treatment plan.

## **Research**

The JNC 8 guidelines used in this study are the most current evidence-based guidelines for the diagnosis and treatment of hypertension. While preparing for this study, a need was found secondary to the limited research available regarding adherence to the most current JNC 8 guidelines. The majority of literature regarding the JNC 8 guidelines shared suggestions for further research in relation to the implementation of the JNC 8 guidelines of hypertension. The findings of this study will aid in future research by allowing expansion of this study's findings such as, identifying barriers to adherence and identifying strategies for improving adherence to evidence-based hypertension guidelines.

## **Conceptual Framework**

Nola Pender's Health Promotion Model (HPM) was the theoretical framework of this study. Pender's HPM is an evidence-based model that has been tested and revised many times. The model serves to establish a pattern of knowledge about health behavior by depicting the nature of people interacting with the environment as they pursue health. The HPM is important for encouraging wellness through a movement toward personal accountability in personal health practices. Pender bases her theory on the idea that individuals who are motivated will modify their lifestyle behaviors to attain certain goals and be in control of their own health. According to the JNC 8 guidelines, patients should have a blood pressure goal for the management of their care. As described in Pender's HPM, patients who are motivated will seek to meet their goal, and in this case, strive to control their blood pressure. The model emphasizes the active role of the patient in managing health behaviors by modifying the environmental context (Allgood, 2014). A study by Hussein, Salam, and Amr (2016) explored the effect of using Pender's HPM in managing hypertension in patients in rural areas. This is relevant to this study because the findings supported the effectiveness of Pender's model in the management of hypertension. The researchers found that education and increased awareness empowers and motivates patients to maintain a healthy lifestyle. This creates a sense of self-efficacy as mentioned in the HPM. Self-efficacy can be maintained and encouraged by goal setting and follow-up visits as outlined in the JNC 8 guidelines. This supports the assertions of the HPM that interpersonal support and influences improve compliance and outcomes.

As healthcare professionals, primary care providers have an important task to ensure positive healthcare outcomes for patients are being efficiently met. In treating patients, it is also imperative to assess patients' own willingness to reach healthcare goals. It is the teamwork and

determination of both providers and patients that can alleviate negative outcomes in these chronic diseases, such as hypertension, diabetes, and chronic kidney disease. Aligning Nola Pender's HPM in the care plan of a patient suffering with such diseases can lay down the pathway of treatment decisions. One of the goals in using the HPM is to validate a patient's self-efficacy. A patient that is suffering with hypertension, for instance, should be encouraged to change their diet, increase their exercise regimen, and decrease their stress levels. They should also be compliant in their pharmacological regimen to further achieve controlled hypertension. Utilizing the HPM helps the patient to see positive outcomes of reaching their own healthcare goals, and goals set forth by their provider. Patients who attain these goals are apt to continue reaching those goals as well as implement future goals for themselves (Heydari & Khorashadizadeh, 2014).

One of the guidelines distributed by the JNC 8 discusses the need for patients to reach a blood pressure goal either by lifestyle modification and/or medication regimen. The JNC 8 guidelines also recommend one-month follow-up visits to ensure effective treatment regimen. The maintenance of a relationship between a patient and their health care provider, which can be maintained through discussion of goals and follow-up visits, is discussed in the theoretical assertions of Pender's HPM. The theoretical assertions state that commitment to a behavior is more likely to occur when significant others, families, and peers including healthcare providers, engage in health-promoting behaviors. Another assertion states that interpersonal influences in one's environment such as healthcare providers can increase or decrease commitment to a person's health-promoting behavior (Alligood, 2014). This illustrates the relationship between Pender's HPM and the importance of abiding to the JNC 8 guidelines as described in this study.

### **Purpose of the Study**

The purpose of this study was to determine if primary care providers used the JNC 8 guidelines for the diagnosis and treatment of hypertension.

### **Research Questions**

The research questions explored in this study included the following:

1. Do primary care providers follow the Eighth Joint National Committee guidelines in diagnosing hypertension in adult patients, including those that are diagnosed with diabetes mellitus and/or chronic kidney disease?
2. Do primary care providers prescribe an antihypertensive medication and initiate lifestyle modifications based on the Eighth Joint National Committee guidelines for those adult patients diagnosed with hypertension, including those that are diagnosed with diabetes mellitus and/or chronic kidney disease?
3. Do primary care providers who diagnose adult patients with hypertension document the need for a follow-up visit within one-month as recommended by the Eighth Joint National Committee guidelines?

### **Definition of Terms**

For the purpose of this study, the researchers defined the following terms:

primary care providers, Eighth Joint National Committee Guidelines, hypertension, adult patient, diabetes mellitus, chronic kidney disease, antihypertensive medication, lifestyle modifications, and follow-up visit. An operational and theoretical definition is provided for each term.

**Primary care provider.**

*Theoretical Definition:* A health care provider (i.e., the nurse practitioner, physician's assistant, or physician) to whom a patient first goes to address a problem with his or her health (Venes & Taylor, 2013).

*Operational Definition:* The provider (nurse practitioner, physician's assistant, or physician) who follows patients for routine medical care.

**Eighth Joint National Committee Guidelines.**

*Theoretical Definition:* A collection of rigorous evidence-based methods, developing evidence statements and recommendations for blood pressure treatment based on a systematic review of the literature to meet user needs, especially the needs of the Primary Care Clinician" (James, et al., 2013)

*Operational Definition:* An evidence-based set of guidelines used by the researchers to evaluate the primary care providers' adherence in hypertension management. The guidelines in this study include: diagnosing hypertension with readings of blood pressure of 150/90 or higher in ages 60 and above, 140/90 or greater in ages 18-59, or for any adult with diabetes or chronic kidney disease with reading of 140/90 or greater, initiate lifestyle modifications and antihypertensive medications when diagnosed, follow-up in one-month to monitor blood pressure and antihypertensive treatment.



**Hypertension.**

*Theoretical Definition:* A condition in which the blood pressure is consistently ranging at levels of 140/90 mmHg or higher (AHA, 2017).

*Operational Definition:* A blood pressure greater than 140/90 mmHg in adult patients aged 18-59, greater than 150/90 mmHg in adult patients aged 60 and above, or for any adult with blood pressure greater than 140/90 mmHg with comorbidities, such as diabetes and chronic kidney disease.

**Adult Patient.**

*Theoretical Definition:* One who is sick with, or being treated for, an illness or injury (Venes & Taylor, 2013).

*Operational Definition:* A person aged eighteen and above seeking medical care from the primary care provider and who is newly diagnosed with hypertension and possible comorbidities of diabetes mellitus and/or chronic kidney disease.

**Diabetes Mellitus.**

*Theoretical Definition:* A chronic illness marked by hyperglycemia either by failure of insulin production by the pancreas or by the body's inability to produce enough insulin to maintain a stable metabolic level (Venes & Taylor, 2013).

*Operational Definition:* A chronic illness that results in the body's inability to regulate glucose levels which can result in microvascular disease leading to organ damage causing comorbidities such as chronic kidney disease and hypertension and is present in the patient's medical record.

**Chronic kidney disease.**

*Theoretical Definition:* An illness in which kidney function diminishes over a 3-month period without returning to normal function (Venes & Taylor, 2013).

*Operational Definition:* A chronic illness which impairs kidney function leading to the body's inability to regulate blood pressure often resulting in hypertension and is present in the patient's medical record.

**Antihypertensive medication.**

*Theoretical Definition:* An agent that prevents or controls high blood pressure (Venes & Taylor, 2013).

*Operational Definition:* A medication selected by the primary care provider and prescribed to the patient diagnosed with hypertension.

**Lifestyle modifications.**

*Theoretical Definition:* A person's pattern of living and behavior, especially as distinguished from the behavior patterns or life choices of others (Venes & Taylor, 2013).

*Operational Definition:* The suggestions made by the JNC 8 guidelines to the adult patient by the primary care provider regarding healthy diet, weight control, regular exercise, and smoking cessation to improve blood pressure and potentially reduce the need for antihypertensive medication.

**Follow-up visit.**

*Theoretical Definition:* The continued care or monitoring of a patient after the initial visit or examination (Venes & Taylor, 2013).

*Operational Definition:* The JNC 8 guidelines' recommendation to return to the primary care provider within one-month after initial diagnosis of hypertension.

## **Assumptions**

For the purpose of this study, the assumptions were as follows:

1. The reviewed charts reflected accurate diagnoses, assessment, and medication profiles.
2. The geographic, demographic, and socioeconomic status of the data is relevant to other southeastern states.
3. The primary care providers utilized for this study were currently aware of Joint National Committee 8 hypertension guidelines.

## **Summary**

Hypertension is a widespread disease process and well-known risk factor for coronary artery disease, stroke, heart failure, and renal failure. Proper diagnosis and treatment of hypertension is crucial in reducing adverse patient outcomes. JNC 8 has released guidelines that recommend proper diagnosis and treatment of hypertension. Specifically, diagnosis of hypertension should be made according to the blood pressure reading, which differs according to the patient's age and co-morbidities such as diabetes mellitus and chronic kidney disease. The JNC 8 guidelines also recommend lifestyle modifications to be initiated with every hypertensive patient, and patients should follow-up one-month after initial diagnosis and treatment of hypertension. It is important for primary care providers to abide by these recommendations because of the research behind the recommendations made by the JNC 8. This study is significant to education, nursing, and further research because of the prevalence of hypertension and because the results of this study are applicable in any primary care provider setting.

## **CHAPTER II**

### **Review of Literature**

Hypertension is a prevalent diagnosis routinely treated in primary care clinics. If hypertension is not appropriately treated, patients can suffer from coronary artery disease, stroke, heart failure, renal failure, and ultimately death (Go AS et al., 2013). The purpose of this study was to determine if primary care providers follow the Eighth Joint National Committee (JNC 8) guidelines to diagnose and treat hypertension because the JNC 8 guidelines of hypertension are the most up-to-date evidence-based research recommendations for high blood pressure. To assess the practice of primary care providers' implementation of the JNC 8 guidelines, current literature was reviewed. Literature including Dr. Nola Pender's Health Promotion Model (HPM) was also reviewed and selected as a framework for this study. Chapter two will examine the latest literature as it relates to using the JNC 8 guidelines in diagnosing and treating hypertension as well as articles which identify barriers to the implementation of these guidelines in the primary care setting.

#### **Literature Related to Conceptual Framework**

The researchers used Nola Pender's Health Promotion Model (HPM) for the theoretical framework of this study. The model serves to establish a pattern of knowledge about health behavior by depicting the nature of people interacting with the environment as they pursue health. The HPM is important for encouraging wellness through a movement toward individual accountability in personal health practices. One of the JNC 8 guidelines discusses the need for patients to have a blood pressure goal through lifestyle modifications and/or antihypertensive medication therapy. This theory contributes to the need for abiding by this guideline and helped to guide this study (Alligood, 2014). Several researchers have tested the efficiency of the HPM

in the past. A study performed by researchers Hussein, Salam, and Amr (2016) adequately revealed the efficiency of the HPM in the treatment of hypertensive patients. Hussein et al. (2016) performed a quasi-experimental design study to assess Nola Pender's HPM effectiveness in the management of hypertension among adult patients located in a rural area. The researchers discovered hypertensive patients living in rural areas were often not treated pharmacologically due to their inability to afford the medications. Non-pharmacologic interventions in treating hypertension included lifestyle modifications such as healthy diet, weight control, physical activity, and stress management. Because hypertension is a leading cause for heart disease, stroke, kidney disease, and disease of the eye, the researchers aimed their study at finding an alternative management of hypertension. The HPM was utilized because the researchers believed if patients could be in control of their own health and were educated about the importance of this disease, patients would gain control over their hypertension diagnosis leading to improved outcomes and better control of their diagnosis of hypertension (Hussein et al., 2016).

Hussein et al.'s (2016) study was comprised of 150 adult patients, aged 18-64, diagnosed with hypertension with or without comorbidities of diabetes mellitus (DM) and/or chronic kidney disease (CKD). The setting took place at El-Shahid Fekry village and Abu-Mashour village at Menoufia Governorate in Egypt. A systematic approach was used to select the setting. The first stage included a random selection of one district out of nine in the Menoufia Governorate with Birket Elsaba being the chosen district. The second stage was a random selection of two villages in the Birket Elsaba district, Abu-Mashbour and Elshahid Ferky.

Several different components helped develop the study performed by Hussein et al. (2016). The first component was a literature review. Hussein et al. (2016) researched material of past and present studies as it related to Pender's HPM in managing hypertension in adult

patients. The second component involved the researchers gaining administrative approval from the director of each Family Health Center to obtain permission for data collection after explaining the purpose of the study to the sample population. The last component was maintaining ethical considerations and human rights of each participant. Confidentiality and anonymity were maintained during the study performed by Hussein et al. (2016) with the participants understanding that partaking in the study was strictly voluntary. Oral consent was obtained from each participant prior to the initiation of the research study. The validity of the study was modeled around the HPM. Hussein et al. (2016) also used the guidance of four experts to make modifications in ensuring the validity of the study was met. Administering a similar test using the same tool and subjects under similar conditions tested reliability. Score correlation between the first test and retest were compared with results of  $R=94.6$ . To ensure the sample population would understand the questions of the questionnaire, the researchers performed a pilot study choosing ten patients with hypertension. Modifications were made per the results, and the pilot sample was discarded from the actual study to ensure result consistency. Once validity and reliability of the study, including the questionnaire, was captured, Hussein, et. al (2016) started with data collection for the study (Hussein et al., 2016).

Data collection occurred over an eight-month period from July 2014 to the end of February 2015. There were two randomly divided groups comprised each of 75 hypertensive adult patients based on location of their residence. Each participant was separately interviewed at their home on three different visits. The first visit consisted of introduction of the researchers, purpose of the study, and hypertension magnitude. Hussein et al. (2016) tested the participants on their knowledge about hypertension, lifestyle modifications, and compliance in treatment. During this visit, the following data was collected: blood pressure, height, weight, and body mass

index. Towards the end of the first visit, education was provided to the participants on hypertension with definitions that included blood pressure, hypertension, different levels of hypertension, classification in adults, risk factors, signs and symptoms, diagnosis, and complications (Hussein et al., 2016).

The second visit occurred within the same week as the first and in the same mechanism as the first visit. This second visit was used to explain the management of hypertension to include non-pharmacological means such as nutrition, reduction in weight, physical activity, smoking cessation and stress management. Hussein et al. (2016) also discussed the treatment of hypertension by means of medication regimen. Finally, the third interview occurred approximately three months after the other visits. The purpose of the third visit was to perform a posttest to assess participants' knowledge after education and home visits were performed. It evaluated the retention of knowledge and the effectiveness of implementing the HPM (Hussein et al., 2016).

Once the data collection was complete, Hussein et al. (2016) compiled their information for statistical analysis using SPSS software (Statistical Product for Services Solution). Several different statistical tests were used to analyze the data including: Chi-square test, Z test, and t-test. For interpretations of the results, the researchers used a p value of  $< .05$ . Results were presented into table graphs or figures based on demographic data, medical data, family medical history, behavior outcome, body mass index and blood pressure, and correlation between percent of improvement in systolic and diastolic blood pressure readings after implementing components of the HPM. The results were as the researchers had hoped to find. Hussein et al.'s (2016) study revealed that participants in the study group, following the HPM, had significant improvement in their hypertension. Results showed the highest mean score was in nutrition followed by

adherence to medication regimen, stress management, and physical activity (Hussein et al., 2016). It was discovered that housewives were more affected by hypertension than their husbands. Those who suffered from complications of hypertension were affected most severely by retinopathy. The study also revealed that 32% of the participants had a familial history of hypertension. The most significant revelation of the study revealed that participants in the study group who followed the HPM had significant improvement in their hypertension.

Recommendations made by Hussein et. al (2016) include health education programs to increase patient awareness about the risks associated with hypertension. Another recommendation was that a treatment plan be implemented with those patients diagnosed with hypertension to closely monitor the treatment regimen. Hussein et. al (2016) also suggested follow-up visits be maintained either in a clinical setting or at the patient's home to ensure adherence to medications and lifestyle modifications. Another important recommendation was the use of media (television, internet, magazines) to promote education and awareness of hypertension. Hussein et al. (2016) cited their belief that these measures would help patients adopt healthier lifestyles while promoting client self-reliance. The researchers were adamant that Nola Pender's HPM is a very reliable theory that can help patients suffering from hypertension or other comorbidities to gain control over their healthcare outcomes (Hussein et al., 2016). Hussein et al.'s (2016) research relates to this study because the researchers were successful in applying Nola Pender's HPM to patients who are diagnosed and being treated for hypertension. This study also used Nola Pender's HPM as the theoretical framework.

Bangalore, Gong, Cooper-DeHoff, Pepine, and Messerli (2014) performed a prospective, randomized, open, blinded-endpoint trial to evaluate optimal blood pressure readings in patients greater than 60 years of age. The JNC 8 guidelines for the management of high blood pressure



recommend a systolic blood pressure threshold for initiation of drug therapy and a therapeutic target of <150 mmHg in those > 60 years of age, a departure from prior recommendations of <140 mmHg as represented in the JNC 7 guidelines (Bangalore et al., 2014). Upon release of the new JNC 8 guidelines regarding hypertension, there was concern regarding the increased threshold for hypertension treatment in the population of patients over the age of 60. According to Bangalore et al. (2014), these recommendations have not been tested in a cohort of patients with coronary artery disease. Therefore, the purpose of this study was to target persons > 60 years of age with hypertension and coronary artery disease in hopes of assessing the impact of the increased threshold of systolic blood pressure (Bangalore et al., 2014).

For the purpose of this study, the researchers categorized patients >60 years of age with hypertension and coronary artery disease and enrolled them in a group entitled INVEST (INternational VErapamil SR Trandolapril Study). This group was used to evaluate the impact of systolic blood pressure <150 mmHg when compared to lower blood pressure readings. INVEST involved 22,576 patients over the age of 60 who were diagnosed with hypertension and coronary artery disease requiring drug therapy. For the methodology in this study, patients were randomly assigned to a multidrug antihypertensive strategy of verapamil-SR (sustained release)/trandolapril or atenolol/hydrochlorothiazide. Each treatment provided excellent blood pressure control, and 70% of these patients achieved a blood pressure of <140/90 mmHg at one year. From the INVEST group, the researchers divided the patients into three subgroups determined by their systolic blood pressure levels: group one was <140 mmHg, group two, 140 to <150 mmHg, and group three, >150 mmHg. Data was collected through an internet-based system which allowed individualization of prescribing practices of blood pressure medications using a treatment algorithm. Patients were seen for follow-up visits every six weeks for the first

six months and then every six months until two years after the patient had enrolled in the study (Bangalore et al., 2014).

For analysis of the findings, Bangalore et al.'s (2014) baseline characteristics were compared between the three groups by a chi-square test for categorical variables or analysis of variance for continuous variables. The Kaplan-Meier method and the long-rank test were used to compare the time to event among the groups. Baseline characteristics did differ between the three groups, so the researchers used a multiple propensity score adjustment approach. The multiple propensity score was estimated with a nonparsimonious multinomial logistic regression model with on-treatment achieved systolic pressure (groups 1, 2, and 3) as the dependent variable and the baseline covariates as the independent variables (Bangalore et al., 2014). The researchers used a Cox proportional hazards model to estimate the effect of comparator groups on the various outcomes and then adjusted the baseline differences with the models that included variables for treatment strategy. All analyses were performed with SAS 9.3 (SAS Institute, Cary, North Carolina) (Bangalore et al., 2014).

For the purpose of Bangalore et al.'s (2014) study, primary outcomes were considered the first occurrence of death from all causes, nonfatal myocardial infarction (MI), or nonfatal stroke. The secondary outcomes were all causes of mortality, cardiovascular mortality, total MI (fatal and nonfatal), total stroke (fatal and nonfatal), heart failure, and revascularization. The outcomes of Bangalore et al.'s (2014) research study involved 8,354 patients over the age of 60 with systolic blood pressure readings of at least 150 mmHg. After two years of treatment and follow-up, 4,787 patients achieved systolic blood pressure <140 mmHg (Group 1); 1,747 had readings of systolic blood pressure 140 to <150 mmHg (Group 2), and 1,820 patients had readings of systolic blood pressure >150 mmHg (Group 3). Group 2 entailed an older population who was

predominantly women of African-American descent and had a higher prevalence of prior MI, coronary artery bypass graft surgery, percutaneous coronary intervention, stroke or transient ischemic attack, unstable angina, diabetes, renal impairment, hypercholesterolemia, and cancer (Bangalore et al., 2014).

In evaluating the primary outcomes of these patients by the unadjusted model, Group 1 had the lowest rate of primary outcome when compared to Group 2; however, in the multiple propensity score-adjusted analysis, the risk of primary outcomes was no different in Group 2 than Group 1. Group 3's risk was significantly increased. Regarding secondary outcomes, Group 1 predominantly had the lowest rate of outcomes such as all-cause mortality, cardiovascular mortality, MI, stroke, and heart failure; Group 3 had substantially increased rates of these outcomes. There were no significant increases in adverse experiences in Group 1 when compared to Groups 2 and 3 (Bangalore et al., 2014).

The INVEST study contributes to this study because it focuses on appropriate management of hypertension. This study did not interview those providers who were not correctly implementing the new guidelines; however, Bangalore et al. (2014) analyzed trends and treatment regarding the provider's choice in hypertension management. Where the INVEST study focused more on the outcomes of hypertension management, this study focused on the management of hypertension according to the guidelines released by JNC 8.

Raju, Solomon, Nithiyan, and Venkatanarayanan (2016) performed a prospective, observational study for the purpose of assessing prescribing patterns in hypertensive patients according to the JNC 8 guidelines. They also evaluated the perception of physicians on the prescribing practices of the JNC 8 guidelines when compared to the Seventh Joint National Committee (JNC 7) guidelines. If hypertension is not effectively treated, patients potentially

suffer from coronary thrombosis, stroke, and renal failure, which contribute to the significance of this research. Raju et al.'s (2016) took place in India, where the prevalence of hypertension is an estimated 25% of urban adults and 10% of adults in rural areas. Raju et al. (2016) believed the lifetime risk of developing hypertension is 90%. According to JNC 8 guidelines, adults aged 60 and above with a systolic blood pressure greater than or equal to 150 mmHg are at significant risk for cardiovascular disease, and the committee recommends lifestyle modifications to prevent this disease. According to the JNC 8 guidelines, thiazide diuretics are used to treat uncomplicated hypertension with the remaining antihypertensive treatment options being Angiotensin-Converting-Enzyme (ACE) inhibitors, Angiotensin Receptor Blockers (ARBs), and Calcium Channel Blockers (CCBs). Raju et al. (2016) also revealed control of hypertension was directly influenced by positive experiences with clinicians that the patients trust (Raju et al., 2016).

This prospective, observational study was performed in a 350-bed tertiary care hospital in Coimbatore, India at KG Hospital and Post Graduate Medical Institute over a period of six months. Of the patients admitted to the hospital during this time frame, 75 had hypertensive prescriptions and were also diagnosed with diabetes mellitus and/or chronic kidney disease. Of the 75 prescriptions, 56 were prescriptions for males and 19 for females. Fourteen of the prescriptions were given to persons under the age of 50, and 36 given to those between the ages of 51 and 65. The last 25 prescriptions were in adults over the age of 65. Out of the 75 prescriptions, 50 patients had diabetes mellitus (DM) as a comorbidity, 10 had chronic kidney disease (CKD) in addition to hypertension, and 15 patients had both DM and CKD. Forty-six of these hypertensive patients were prescribed with monotherapy, and the remaining 29 patients were prescribed with a variation of combination therapy. Diuretics were the most commonly

prescribed medication for monotherapy followed by CCBs, ARBs, beta blockers, ACE inhibitors, alpha blockers, and alpha + beta blockers. In two-drug combination therapy, five prescriptions included a CCB and alpha blocker, four prescriptions included a CCB and loop diuretic, and four prescriptions included a beta blocker and loop diuretic. With three-drug combinations, a loop diuretic, CCB, and alpha blocker were two prescription practices and one contained a loop diuretic, CCB, and an alpha + beta blocker. Only two prescriptions were found with four-drug combination therapy. All of these prescribing practices were analyzed with the JNC 8 guidelines, and the following was found: 42 prescriptions fell into the group of irrational, meaning they did not correlate with the JNC 8 guidelines; 12 of the prescriptions were semi-rational, meaning they partly complied with JNC 8 guidelines; 21 prescriptions were rational, meaning they were in compliance with JNC 8 guidelines (Raju et al., 2016).

In addition to determining the findings of prescribing practices of antihypertensives by physicians, Raju et al. (2016) also sought to analyze the physicians' attitude towards the applicability of the JNC 8 guidelines over the JNC 7 guidelines in a clinical setting. For this to be evaluated, Raju et al. (2016) prepared a questionnaire with five questions, and it was distributed among physicians who prescribe antihypertensive drugs. The results revealed seven physicians were comfortable with the recommended prescribing practices of the JNC 8 guidelines while thirteen were not comfortable with adapting to these new standards.

Raju et al. (2016) concluded several different findings from their research study. First, monotherapy was prescribed more frequently than combination therapy when it came to managing hypertension in the seventy-five hospitalized patients. As the JNC 8 guidelines suggest, loop diuretics were the most frequently prescribed drug class followed by CCBs, ARBs, beta blockers, ACE inhibitors, alpha blockers, and then alpha + beta blockers. According to the

researchers, diabetes mellitus was the most frequently occurring co-morbidity with hypertension. Lastly, only 28% of prescriptions were consistent with JNC 8 guidelines, whereas, 56% of prescriptions were irrational. Raju et al. (2016) suggested the need for an effective update of knowledge for the physicians so that there may be a higher compliance rate in prescribing practices by the JNC 8 guidelines. The researchers confirmed the need for a clinical pharmacist in each department of the hospital to improve adherence to the guidelines in the hospital setting (Raju et al., 2016).

Raju et al.'s (2016) research closely parallels this study because they too evaluated the prescribing practices of providers. Raju et al.'s (2016) study went into more detail with the specific antihypertensives prescribed, whereas, this study only evaluated if the patients are receiving treatment for the diagnosis of hypertension with lifestyle modifications or antihypertensive medications. In contrast, Raju et al.'s (2016) study was conducted in the hospital setting and this study was performed in primary care clinics. Raju et al. (2016) reviewed any patient with hypertension regardless of other diagnoses, whereas, those with diabetes and/or chronic kidney disease were evaluated separately because of the emphasis placed by JNC 8 guidelines in this study. Overall, the study performed by Raju et al. (2016) contributes to this study because it builds a strong foundation of the shared similarities.

Alshehri, Almigbal, Alodhayani, Batais (2017) completed a cross-sectional study to evaluate adherence of family and internal medicine residents to the JNC 8 guidelines for hypertension in Riyadh. Alshehri et al. (2017) also identified related residents' characteristics. The goal of hypertension management is to prevent target organ damage such as renal, cardiovascular, and cerebrovascular problems. The JNC 8 guidelines updated recommendations for hypertension in 2013 and published the guidelines in 2014. Barriers to the JNC 8 guidelines'

implementation have been identified as physicians' lack of familiarity, disagreement with some of the recommendations, and poor patient adherence. During residency training, practice patterns are likely to be the basis for lifelong practice. If observances of the resident adherence to the guidelines are suboptimal, then changes may need to be made to residents' education and practice (Alshehri et al., 2017).

The purpose of Alshehri et al.'s (2017) study was to assess the awareness and adherence of the JNC 8 guidelines as well as identify associated residents' characteristics. In the Kingdom of Saudi Arabia, there has been a deficiency in the control of hypertension despite the advancement in the management of hypertension. Many healthcare providers lack the knowledge to diagnose hypertension and treat accordingly to the guidelines (Alshehri et al., 2017).

The study performed by Alshehri et al. (2017) was designed using a cross-sectional study among family and internal medicine residents. A total of 120 residents were approached to complete a questionnaire. Out of those residents, 109 residents responded to the questionnaire. A residency training hospital, King Saud University Medical City, in the Kingdom of Saudi Arabia is where the study was performed. King Saud University Medical City is an 800-bed hospital residency-training program, including family and internal medicine residency programs. The study participants, both male and female, were family and internal medicine residents currently working at King Saud University Medical City in Riyadh. The study was conducted between February 2016 and April 2016 using a self-administered questionnaire. The questionnaire was developed by the principal investigator which was a family medicine resident, after an extensive review of the published literature based on the JNC 8 guidelines. The first section of the questionnaire collected residents' demographic information, such as age, gender, nationality marital status, residency program, and residency level. It also included the total of hypertensive

patients seen in a week's time, the proportion of hypertensive patients among all the patients seen, and the awareness of the JNC 8 guidelines. The second section of the questionnaire assessed the residents' adherence to the JNC 8 guidelines. JNC 8 has nine guidelines regarding hypertension; however, for Alshehri et al.'s (2017) study, recommendation nine was divided into two different recommendations which made a total of 10 recommendations (Alshehri et al., 2017).

Ethical approval was gathered from the Institutional Review Board, College of Medicine, and King Saudi University. Physicians were invited to participate in the study once objectives were explained. Confidentiality was reassured to the physicians regarding information collected from the study. The return of the questionnaire was assumed to imply consent for the study. The Statistical Package for the Social Sciences software version 21 was used for statistical analysis of returned questionnaires. Residents were classified as "unaware of the guidelines" if they answered "never knew" on the question on familiarity with the guidelines. They were considered to follow the recommendation when they "always" or "more than half of the time" applied it in their clinical practice using an awareness-adherence model. The chi-square test was used to differentiate adherence to the JNC 8 recommendations between family and internal medicine residents. The continuous scale was converted to a nominal scale to dichotomize adherent and non-adherent physicians. A score numbered 1-20 was considered non-adherent. Those who scored 21-40 were considered adherent. At the end, the chi-square was used to determine the relationship between residents' demographic characteristics and their overall adherence to the JNC 8 guidelines (Alshehri et al., 2017).

The socio-demographic results showed that the average age of the residents was 27 years of age. Of the 109 returned questionnaires, 59 were male residents and 50 were female. Internal



Medicine residents contributed to 64% of the study, and 34% were family medicine residents. All years of residency were included, where 3-year residents represented 34%, 2-year residents represented 27%, 1-year residents represented 26%, and 4-year residents represented 14%. The average number of hypertensive patients seen by the residents was 14.6. Ninety-eight percent of the residents were aware of the JNC 8 guidelines in diagnosing and treating high blood pressure in adults. Adherence of the guidelines varied between 65.1% to 78%. The least adherence (65.1%) was to JNC 8 guideline recommendation four which was to initiate pharmacologic treatment in patients above 18 years of age with chronic kidney disease to lower blood pressure to a goal less than 140/90 mmHg. Recommendation five had 78% adherence to initiate pharmacologic treatment in the diabetes population. Family medicine residents showed more adherence to the JNC 8 guidelines than internal medicine residents. The overall adherence to the JNC 8 recommendations was 88.1%. There were no noteworthy connotations between residents' adherence and all demographic characteristic variables. The study proved that almost all family and internal medicine residents were aware of the JNC 8 hypertension guidelines. Despite their awareness, only 88.1% adhered to the guidelines. Some of the barriers identified in the study included but were not limited to disagreement with some of the recommendations, the absence of motivation, reluctance to change the therapy, a lack of outcome expectancy, a high number of patients seen, and inadequate consultation time. These barriers may need to be further considered in the future to supplement this study (Alshehri et al., 2017).

The study performed by Alshrhri et al. (2017) contributed to this study because of the correlated purposes. The purpose of this study was to determine if primary care providers routinely use JNC 8 guidelines for the diagnosis and treatment of hypertension which is similar to Alshehri et al.'s (2017) study. If primary care providers are not fully knowledgeable about

new guidelines, therefore, not adhering to the latest evidence-based guidelines, poor patient outcomes can result in increased morbidity or mortality. Like Alshehri et al.'s (2017) study, this study is not solely based on each recommendation of the JNC 8 guidelines, but rather the similar goal of improved outcomes for hypertensive patients.

Aydogan, Dogander, Atik, Rohrer, Gok, Cirpan, Yilmaz, and Saglam, (2015) studied hypertensive patients with the goal of identifying adherence of providers to the JNC 8 guidelines. Hypertension is present in several countries worldwide, but has a very high prevalence in Turkey, which is where this study took place (Aydogan et al., 2015). According to the JNC 8 guidelines, hypertension is diagnosed when blood pressure is 150/90 or higher in ages 60 and above, 140/90 or greater in ages 18-59, or for any adult with diabetes and/or chronic kidney disease with reading of 140/90 or greater. Aydogan et al. (2015) sought to evaluate if these blood pressure readings were obtainable with antihypertensive therapy. The researchers hypothesized some of the demographics and comorbidities of the study participants to have an impact in achieving blood pressure goals (Aydogan et al., 2015). The documented demographics were age, gender, smoking status, and family history of hypertension. Aydogan et al. (2015) also considered several comorbidities of the patients such as coronary artery disease, diabetes, obesity, dyslipidemia, and chronic kidney disease. Thirty-nine percent were under the age of 60, 60.5% were over the age of 60, 77.2% were female, 22.8% were male, 15.6% were current smokers, and 49.6% had a family history of hypertension. Approximately 14% had a history of coronary artery disease, 25.4% were diabetics, 24.6% were obese, 67% had a diagnosis of dyslipidemia, and 69.7% had chronic kidney disease (Aydogan et al., 2015).

Aydogan et al. (2015) conducted a retrospective cohort study of 276 random sample patient with a diagnosis of hypertension. During this study, the patients had a total of two visits

to the outpatient hypertensive clinic in Turkey, one initial visit and a second visit six months later. Blood pressures were performed at both visits, which required the patients to rest for five minutes prior to obtaining the reading. The patients were also instructed to not smoke or drink caffeine 30 minutes prior to their appointment time. Two manual blood pressure measurements were taken at each visit, and the mean value of the measurements were the ones reported for the study. The researchers used the Statistical Package for Social Sciences 22.0 for Windows to perform their analysis. They also used multivariate linear regression analysis to assess the association in variance in blood pressures with the two separate visits (Aydogan et al., 2015).

The study performed by Aydogan et al. (2015) compared the patients' blood pressure readings from their initial visit to their first follow-up visit six months later after receiving antihypertensive medication therapy. At the baseline visit, 29.7% of patients were on target with their systolic blood pressure goals according to the JNC 8 guidelines. After six months of antihypertensive therapy, 65.5% were at their target systolic blood pressure goals. With the diastolic blood pressure readings, 26.8% of patients at their initial visit were on target, and 55.1% were on target after six months. At the initial visit, eighteen percent of the patients were on target with their systolic and diastolic blood pressure goals, and 18.6% were on target with both readings at their six-month follow-up. Aydogan et al.'s study revealed that blood pressure results decreased over the six-month period for most patients; however, the overall management of hypertension with only antihypertensives was not sufficient in complete compliance with the JNC 8 guidelines. Aydogan et al. (2015) suggested future research to include non-pharmacological interventions such as physical activity and dietary modifications as well as pharmacological interventions for patients with hypertension (Aydogan et al., 2015).

Aydogan et al.'s (2015) research was beneficial to this study because of the similarities in providers' compliance of the JNC 8 guidelines of hypertension. The study performed by Aydogan et al. (2015) also assessed blood pressure readings according to the JNC 8 guidelines, which revealed positive outcomes when used, contributing to the credibility of this study.

Abel, Contino, Jain, Grewal, Grand, Hagans, Roy (2015) completed a retrospective review of electronic medical records to compare target blood pressure goals and frequency of end-organ damage in adult African-Americans. Abel et al. (2015) also evaluated antihypertensive medications other than a calcium channel blocker and/or a thiazide-type diuretic. The researchers based their blood pressure goals on the JNC 8 guidelines of hypertension. Hypertension is a significant contributor to chronic diseases and complications such as myocardial infarction, chronic kidney disease, metabolic syndrome, and heart failure. When left untreated, hypertension can lead to death (Abel et al., 2015).

According to the JNC 8 guidelines of hypertension, African-Americans with hypertension and/or diabetes mellitus should receive initial antihypertensive treatment of a thiazide-type diuretic or calcium channel blocker (Abel et al., 2015). Abel et al. (2015) hypothesized African-American adults diagnosed with hypertension who are treated with calcium channel blockers and/or thiazide diuretic therapy to have better blood pressure control than other antihypertensive medication classes. The researchers also hypothesized a decrease in associated target organ damage such as chronic kidney disease, cardiac disease, and retinopathy with appropriately treated hypertension (Abel et al., 2015).

The study performed by Abel et al. (2015) was reviewed and approved by the Institutional Review Board of the Cooper Health System, Camden, New Jersey, USA. HIPPA requirements were followed and informed consent waivers were approved by the Institutional

Review Board. The population consisted of African-American patients 18 years of age and older with an established diagnosis of hypertension. The patient population followed up in the researchers' internal medicine clinic between the dates of January 1, 2014 and December 31, 2014. Data for each patient was collected including age, gender, systolic and diastolic blood pressure readings, heart rate, body mass index, and comorbidities. Past and present history was collected and consisted of tobacco use, coronary artery disease (CAD), myocardial infarction (MI), transient ischemic attacks (TIA), cerebrovascular accidents (CVA), chronic kidney disease (CKD), hypertensive retinopathy, peripheral arterial disease (PAD), hyperlipidemia, or diabetes mellitus. Patients were also asked if they were currently taking thiazide-type diuretics, calcium channel blockers, ace inhibitors, aldosterone receptor blockers, beta-blockers, alpha-blockers, or any other antihypertensive medications. All other antihypertensive medications were accounted for by writing down the name and dose of each medication. The sample size consisted of 344 patients. The patients were selected based on the estimated number of patients with a diagnosis of hypertension and who were also expected to visit the office within the study period. The patients were divided into groups based on the antihypertensive therapeutic agent. Group one patients were on a thiazide-type diuretic only. Group two patients were on calcium channel blockers only. Group three patients were on a thiazide-type diuretic and a calcium channel blocker. Lastly, group four patients were on other antihypertensive agents that were neither thiazide-type diuretics nor calcium channel blockers. Systolic and diastolic blood pressures were compared by using one-way analysis of variance analysis. Pearson's chi-square test and Fisher's exact test were used to compare baseline characteristics and evidence of end-organ damage (Abel et al., 2015).

Of the sample studied, 344 African-American patients were diagnosed with hypertension. Out of the 344, twenty-one patients were excluded from the study due to being managed conservatively without antihypertensive medication. The results revealed that the differences in age and gender were not statistically significant. All four groups had controlled systolic blood pressures. The average systolic blood pressure in the groups ranged from 128.7-133.5 mmHG. The average diastolic blood pressures ranged from 80.0-82.3 mmHg. The average heart rates were within the normal range of 71-77 beats per minutes with no significant difference. The overall prevalence of cardiovascular disease in each group ranged from 16.1 to 24.2%, but the differences were not significant. The prevalence of associated target organ involvement in the form of MI or CAD, TIA or CVA, PAD, and CKD between the four groups showed no statistically significant difference between the groups (Abel et al., 2015).

The study performed by Abel et al. (2015) was beneficial to this study because Abel et al. (2015) focused their study on the JNC 8 guidelines for hypertensive patients which parallels the purpose of this study. This study, however, did not collect data on specific medication prescribed whereas the study performed by Abel et al. (2015) did collect that data. Overall, Abel et al.'s (2015) study was useful in regard to the benefits of JNC guidelines for hypertensive patients (Abel et al., 2015).

Adeniyi, Yoguswaran, Longo-Mbenza, and Goon (2016) performed a cross-sectional study to determine the lack of data on the prevalence, treatment, and control of hypertension in individuals living with Type 2 Diabetes Mellitus (T2DM) in rural communities of South Africa. T2DM and hyperlipidemia are additional types of cardiovascular diseases that can occur with hypertension. There are inconsistencies in the recommendations by different organizations on blood pressure regulations. The recently published JNC 8 guidelines have confirmed blood

pressure less than 140/90 mmHg as the desired target for people living with T2DM. The JNC 8 guidelines along with patient demographics were used to examine the high prevalence of uncontrolled hypertension in individuals with accompanied T2DM in rural communities of South Africa (Adeniyi et al., 2016).

Adeniyi, et al. (2016) had questions and purposes they sought to achieve during their research study. The first apparent question: is there a significant overlap in the etiology and disease mechanism of hypertension and diabetes? Secondly, is there a prevalence of uncontrolled hypertension in individuals with accompanied hypertension and T2DM (Adeniyi et al., 2016)?

The cross-sectional study was conducted in Mthatha, South Africa in Mthatha General Hospital among 360 adults, 30 years and older, living with T2DM. The participants for the study had history of treatment for T2DM for at least one year and attended follow-up care at Mthatha General Hospital from July to November in 2013. The hospital oversaw 15 community health centers and clinics from rural communities surrounding Mthatha. The study excluded 33 participants with incomplete medical data. Of the 327 total adults with hypertension, the analysis included only participants with accompanied hypertension and T2DM which included a total of 265 participants. The study protocol, consent form, and participants' information sheet were granted approval by the Walter Sisulu University Ethics Committee. Each participant was provided information that explained the purpose, process of research, the participants' rights, and contact details, all which was written in English and IsiXhosa languages. The participants signed a consent to indicate their voluntary participation (Adeniyi et al., 2016).

The data was collected through review of medical records and interviews. The participant's age, sex, marital status, level of education, residence type, status of employment, monthly income, dietary contents, smoking status, sugared-drink consumption, and physical

activity were collected through an interview. The participant's history of diabetes, medications, and other medical conditions were obtained from the medical records. Height, weight, and body mass index were measured in accordance with the World Health Organization (WHO) criteria. Blood pressure was measured after patients were sitting for at least five minutes, arm level of the heart, and feet together, flat on the ground. Proper cuff sizes were used for each participant. Uncontrolled hypertension was defined according to the blood pressure treatment goals recommended by JNC 8 guidelines which is a systolic blood pressure greater or equal to 140 mmHg and diastolic blood pressure greater or equal to 90 mmHg (Adeniyi et al., 2016).

The 265 participants with accompanied hypertension and T2DM were all being treated with antihypertensives. Of those 265 participants, 200 had uncontrolled hypertension (75.5%). There was a significant correlation of male sex, unemployment, alcohol intake, western-type diet, and anti-hypertensive medications with prevalent uncontrolled hypertension. Three separate groups were developed from all T2DM participants: absence of hypertension (n=62), controlled hypertension (n=65), and uncontrolled hypertension (n=200). Between the mean duration of T2DM and the hypertension groups, it revealed a positive linear association. The outcomes of care in the study population were worrisome and may have been comparable to those participants who were not yet diagnosed. The researchers concluded that they failed to change the prognosis in most of the individuals with accompanied hypertension and T2DM; poor health outcomes of the individuals living with the double load of diseases is accurate (Adeniyi et al., 2016).

The data in this study was collected to determine if hypertension and T2DM were accompanied by one another, and if there was a prevalence of uncontrolled hypertension with individuals who were diagnosed with hypertension and T2DM. JNC 8 guidelines were used as criteria to determine whether the participant was hypertensive or not. There was a significant



correlation between individuals who were diagnosed with T2DM and lived with uncontrolled hypertension. In addition, the JNC 8 guidelines also recommend individuals who are newly diagnosed with hypertension to return for a follow-up visit one month after diagnosis. It is evident in the study performed by Adeniyi et al. (2016) the individuals who experienced uncontrolled hypertension with T2DM were not properly managed after diagnosis. In this study, data was collected to determine if primary healthcare providers follow the JNC 8 guidelines in the diagnosis and management of hypertension. This study also evaluated patients who were diagnosed with hypertension and/or diabetes mellitus just as the study by Adeniyi et al. (2016) did to determine correlations in uncontrolled hypertension and T2DM (Adeniyi et al., 2016).

Kelly, Saseen, and Marrs (2017) performed a retrospective cohort study to determine if patients aged 60-79 being treated for hypertension according to the JNC 8 guidelines had better systolic pressure control as compared to previous patients treated before the new updated recommendations. According to Kelly et al. (2017), sixty-five percent of patients, aged 60 and above, are at a greater risk for developing hypertension, and though it is a major risk factor for cardiovascular disease, stroke, and chronic kidney disease, hypertension is a modifiable disease if appropriately controlled. Kelly et al. (2017) examined guidelines from both the American Society of Hypertension and the International Society of Hypertension (ASH/ISH) and the JNC 8 guidelines of hypertension; all of which were released in the year 2014. The JNC 8 guidelines recommend a systolic blood pressure of < 150 mmHg in patients aged 60 and above without diabetes or CKD while the ASH/ISH recommend treating patients aged 80 and above with the same systolic blood pressure goal. The researchers' hypothesis states that patients who were pharmacologically treated for hypertension following the new JNC 8 guidelines would reach the systolic blood pressure goal set forth by those guidelines (Kelly et al., 2017).

The methodology of Kelly et al.'s (2017) study was comprised of patients who were newly diagnosed with hypertension, and at the same time, prescribed antihypertensive medications pre- and post-implementation of the JNC 8 guidelines. After receiving approval from the Colorado Multiple Institutional Review Board, data was collected from seven University of Colorado Health primary care clinics by means of electronic health records. The sample criteria data included patients aged 60-79 who were newly prescribed medication(s) for hypertension between the dates of January 1, 2012 to October 1, 2015. Other criteria included a new diagnosis for hypertension (ICD-9 code 401.x) and a minimum of one follow-up visit with reassessment of hypertension and without changes to medication regimen. Exclusion criteria included: diabetes diagnosis (ICD-9 code 585.x) or kidney transplant (ICD-9 code V42.0). Patients who were on antihypertensive medications for other purposes than to treat hypertension were also excluded from this study. The researchers then separated the eligible patients into groups by dates of January 1, 2012 to December 31, 2013 and January 1, 2014 to October 1, 2015. Further data extracted to identify inclusive patients included: age, gender, ethnicity, current tobacco use, date and name of newly prescribed antihypertensive drug, initial systolic blood pressure reading, unique number of antihypertensive medications at primary care visits, dates blood pressure was assessed in clinic, and where no changes were made to antihypertensive regimen (Kelly et al., 2017).

For statistical analysis, Kelly, et. al (2017) used Microsoft Excel to compare the primary and secondary endpoints using an unpaired t test. Data, which was categorized into cohort groups, was analyzed using two-tailed chi-square and calculated with GraphPad Software. The researchers determined that a sample size of 128 patients (64 per group) was necessary to provide sufficient data analysis. On data review, Kelly et al. (2017) was able to conclude that the

goal systolic blood pressure of < 150 mmHg was achieved without having to modify pharmacology treatment, and this is a recommendation in the JNC 8 guidelines of hypertension.

The study performed by Kelly et al. (2017) provided a sound foundation for this study. Kelly et al. (2017) recommended data collection to occur at various clinics not associated with one another, which is an aspect this study included for data collection. Another important foundation for this study is that Kelly et al.'s (2017) study answered one of the current research questions: do primary care providers prescribe an antihypertensive medication or initiate lifestyle modifications for patients diagnosed with hypertension? Kelly et. al (2017) was able to ascertain that primary care providers do prescribe antihypertensive medications along the JNC 8 guidelines of hypertension (Kelly et al., 2017).

Snipelisky, Waldo, and Burton (2015) performed a multisite survey for the purpose of evaluating providers' current practice in the diagnosis and management of hypertension in comparison to the new JNC 8 recommendations. The methodology of this study included a 17-question, multiple choice answer survey sent via email to cardiology providers and faculty physicians employed by three different Mayo Clinics in the states of Arizona, Florida, and Minnesota. Most of the providers were male (n=61, 79.2%) and the majority were non-interventional cardiologists (n=16; 20.8%). A total of three emails were sent separately over a one-week course in May 2014, and the survey was comprised of three main components: demographic information including location and practice years of providers, questions related to current diagnosis and management guidelines for hypertension, and choice of pharmacological treatment of hypertension. A total of 251 surveys were emailed with 77 responses received in return (Snipelisky et al, 2015).

Following survey response review, the researchers determined that participating providers did not follow the JNC 8 guidelines when treating patients aged 60 and above citing less than 25% agreed with the systolic blood pressure goal of 150 mmHg. Results also revealed that for patients with comorbidities, such as chronic kidney disease and diabetes, providers preferred tighter blood pressure controls than the recommended JNC 8 guidelines. Further results, however, revealed that pharmacology treatment closely followed the JNC 8 guidelines (Snipelisky et al, 2015).

Snipelisky, et al. (2015) reported data was collected approximately six months after the new recommendations were published. Also, there was no pre-guideline data collected making it difficult for researchers to evaluate clinic practices prior to the JNC 8 publication. For these reasons, the researchers encouraged future data collection. They felt with longer implementation time since publication of the new guidelines, more providers would likely have adopted the new recommendations (Snipelisky et al., 2015). This applies to this study because the dates chosen for chart review started in 2014, which was the year of initiation of the guidelines and close to the same time frame of Snipelisky et al.'s (2015) study. The chart reviews performed during this study include the years 2014-2018, which is a longer time frame and was a suggestion of Snipelisky et al.'s (2015) study to future researchers.

Malik, Uzair, Hussain, and Lubbe (2016) performed a cross-sectional study for the purpose of assessing the knowledge and perceptions of prescribers regarding adherence to the JNC 8 guidelines for the treatment of hypertension in two major cities in Pakistan. Malik, et. al (2016) sought to discover the following information: providers' knowledge about the JNC 8 guidelines in the treatment of hypertension, providers' perceptions of the new guidelines, and providers' adherence to those guidelines (Malik et al., 2016).

The study performed by Malik et al. (2016) was conducted from June to August 2015. The population of the study consisted of providers from Islamabad and Ravalpindi. Sample size calculations used the Raosoft sample size calculator to determine a sample size representative of the population of providers. The sample size was 385—achieving a 95% reliability rate. A questionnaire was developed using the JNC 8 guidelines for treating hypertension. The questions were developed during two separate group discussions which included four separate groups of experts. A Cronbach alpha value of 0.823 confirmed reliability and consistency of the questionnaire which consisted of five sections. Information relating to provider demographic characteristics comprised the first section. The second section explored providers' perceptions regarding current treatment practices. The third section investigated providers' perceptions towards lack of adherence. The fourth section tested prescribers' knowledge of JNC 8 treatment goals and drug regimens for hypertension. The last section explored providers' perceptions of the effectiveness of lifestyle modification in the control and management of hypertension. There was 100% participation from the 385-sample size which was hand delivered by trained volunteers and returned on the same day (Malik et al., 2016).

Following analysis, the researchers determined that less than 50% of prescribers knew the correct treatment goals for management of hypertension as stated in JNC 8, and many did not have adequate knowledge of drug regimens. Furthermore, prescribers overestimated their compliance to hypertension treatment guidelines. The study identified that most prescribers felt the main factors contributing to lack of adherence with the guidelines were patient-related factors, availability of guidelines for reference, lack of awareness, and lack of enforcement. Despite the lack of knowledge and adherence to JNC 8 guidelines, the study found that most prescribers had positive perceptions toward the guidelines (Malik et al., 2016).

The researchers were able to unveil that the participating providers had initiated lifestyle behavior modifications in patients diagnosed with hypertension. Those patients that reduced weight, controlled dietary intake of sodium, and began an exercise regimen had reduced risks of cardiovascular disease along with better management of their hypertension diagnosis (Malik et al., 2016). Similar to the study performed by Malik et al. (2016), this study reviewed primary care providers' initiation of lifestyle modifications for newly diagnosed hypertensive patients as recommended by the JNC 8 guidelines of hypertension. Although patient outcomes regarding lifestyle modifications were not investigated, patient education for lifestyle modifications is of equal importance.

### **Summary**

According to the latest literature, implementation of the JNC 8 guidelines of hypertension has shown positive results for patients who are receiving treatment for hypertension as well as providers who are implementing these guidelines into practice. From studies that revealed patients who initiated lifestyle modifications resulted in efficient management of their hypertension, to a study that concluded implementation of the JNC 8 guidelines in primary care resulted in cost-savings in cardiovascular events and deaths, many demonstrated positive outcomes from the implementation of the JNC 8 guidelines. Although many studies discovered positive aspects of the JNC 8 guidelines of hypertension, several others revealed a lack of knowledge from the providers' perspective along with providers feeling uneasy in abiding to different blood pressure guidelines when compared to the JNC 7 guidelines. Literature also revealed a need for further research on the subject matter and an increase in education on the new blood pressure guidelines of JNC 8 further validating the need for this study.

## **CHAPTER III**

### **Methodology**

Hypertension is a prevalent diagnosis routinely treated in primary care clinics. If hypertension is not appropriately treated, patients can suffer from coronary artery disease, stroke, heart failure, renal failure, and ultimately death (Go AS et al., 2013). The purpose of this study was to determine if primary care providers have implemented the Eighth Joint National Committee (JNC 8) guidelines to diagnose and treat hypertension. A retrospective chart review was completed in various primary care clinics located in the southeastern United States. The data collected from each chart was used to determine if primary care providers were implementing the JNC 8 guidelines for hypertension into practice. This study evaluated charts of patients over the age of 18 who had been newly diagnosed with hypertension within the years 2014 to 2018 due to the initiation of the JNC 8 guidelines on January 1, 2014. Chapter three further details the design, methodology, implementation, and data analysis that was used to conduct this study.

#### **Design**

The design of this study was a quantitative, retrospective chart review performed in various primary care clinics in the southeastern United States. A convenience sample of patients 18 years of age and older included multiple ethnicities: Caucasian, African-American, and Hispanic. Any person who was newly diagnosed with hypertension, with or without diabetes mellitus (DM) and/or chronic kidney disease (CKD), within the years 2014 to 2018 was included in this study. This research design was appropriate to address the research questions of the study and also allowed the reviewing of documentation by the primary care providers.

**Setting**

The setting of this study took place in six different primary care clinics in the southeastern United States. Each primary care clinic was numerically coded to assure confidentiality but also to be able to differentiate the primary care clinics. Primary care clinics 2, 3, 4, 5, and 6 were located in a rural setting while primary care clinic 1 was in an urban location. Primary care clinics 1, 2, 3, and 5 accepted all forms of medical insurance; however, primary care clinics 4 and 6 either did not accept Medicaid and Medicare or only filed limited parts of those insurances. Primary care clinics 3, 4, and 6 were operated by nurse practitioners and primary care clinics 1, 2, and 5 had nurse practitioners and physicians. All reviewed charts were of patients over the age of 18 and of ethnicities including Caucasian, African-American, and Hispanic with the majority of patients being Caucasian. There were also patients with comorbidities of diabetes and/or chronic kidney disease; however, diabetes mellitus was a more prevalent comorbidity than chronic kidney disease or both. The majority of patients had hypertension only or other diagnoses not included in the consideration of the JNC 8 guidelines.

**Population and Sample**

The population of this study was the primary care providers in the various primary care clinics of the southeastern United States. Primary care providers frequently manage patients with hypertension, therefore, the focus of this study was their implementation of the JNC 8 guidelines of hypertension. The population of primary care providers included twelve nurse practitioners and nine physicians between six clinics.

The sample of this study included 328 patients ranging from 18 years of age and older who were newly diagnosed with hypertension after January 1, 2014. To collect this sample, charts were obtained by the hypertension diagnostic ICD 10 code, I10. To separate those who



were newly diagnosed with hypertension, the patient could not currently be prescribed antihypertensive therapy prior to this clinic visit. To determine those diagnosed with hypertension according to the JNC 8 guidelines, the blood pressure reading was reviewed. If the patient's blood pressure was greater than 140/90 mmHg for patients < 60 years of age or with comorbidities of diabetes and/or chronic kidney disease, they were categorized as hypertensive. If the patient's blood pressure was greater than 150/90 mmHg for patients > 60 years of age, they were considered hypertensive as illustrated by the JNC 8 guidelines. For patients diagnosed with hypertension by the ICD 10 code, I10 but not in accordance to the JNC 8 guidelines, they were categorized as "normal" or non-hypertensive. For the chart to be included in the study's review, it was linked to a diagnostic ICD 10 code, I10 essential (primary) hypertension, by the primary care provider; however, if the blood pressure reading was not considered hypertensive by the JNC 8 guidelines, this verified noncompliance of the primary care provider in abiding by the JNC 8 guidelines of hypertension.

### **Methods of Data Collection**

This study was first approved by the Institutional Review Board (IRB) (see Appendix B). After approval was obtained from the IRB, the six team members obtained written consent from six primary care clinics in the southeastern United States (see Appendix C). The team members then requested access to the electronic medical record and/or paper charts. The office manager of each clinic performed a query of the facility's electronic patient database using the ICD 10 diagnosis code, I10 essential (primary) hypertension to identify patients with hypertension. The search was then narrowed to charts of patients over the age of 18 dated after January 1, 2014. Only charts of patients dated after January 1, 2014 were included because the JNC 8 guidelines of hypertension were released for implementation at that time. The JNC 8 guidelines of

hypertension also only included adult patients over the age of 18; therefore, only patients over the age of 18 were included in this study. The team members reviewed each chart, collecting the most recent charts first, beginning in March 2018.

The team members utilized the data collection tool (see Appendix D) by applying the data collection legend (see Appendix E), also developed by the team members, which coded each category of data. Each category was listed on the legend and coded numerically with multiple options for each area of data. If multiple options were applicable to the findings on the patient's chart, multiple numbers were recorded on the data collection tool and applied toward the findings of the study. Every researcher utilized the same data collection tool for each patient to ensure consistency of the study.

There was a total of 328 patient charts that met the parameters of: 18 years of age and older and newly diagnosed with hypertension after January 1, 2014 as evidence by no antihypertensive therapy prior to the current clinic visit. The data for the study was collected and documented using a standardized data collection tool and data collection legend. The data collection tool was developed by the team members and included: gender, age, race/ethnicity, blood pressure classification, comorbidities of diabetes mellitus and/or chronic kidney disease, documented antihypertensive therapy, documented need for one-month follow-up, lifestyle modifications, type of insurance, and type of primary care provider. The categories of gender, age, race/ethnicity, insurance, and primary care provider were collected for means of analyzing data results. The categories of blood pressure classification, comorbidities of diabetes mellitus and/or chronic kidney disease, documented antihypertensive therapy, and documented need for one-month follow-up were collected because these are recommendations included in the JNC 8 guidelines of hypertension. In regards to blood pressure classification, the patient chart was

either categorized as hypertensive or normal. According to the JNC 8 guidelines, if the patient's blood pressure was greater than 140/90 mmHg for patients < 60 years of age or with comorbidities of diabetes and/or chronic kidney disease, they were categorized as hypertensive. If the patient's blood pressure was greater than 150/90 mmHg for patients > 60 years of age, they were considered hypertensive. If the patient's blood pressure was less than these parameters, they were categorized as normal or non-hypertensive, even though the primary care provider diagnosed them with hypertension as evidenced by the ICD 10 code, I10. This phenomenon would be an example of noncompliance by the primary care provider in the JNC 8 guidelines. Comorbidities of diabetes and/or chronic kidney disease were also included in data collection because JNC 8 includes those conditions when determining diagnosis and treatment therapy for the hypertensive patient.

The JNC 8 guidelines not only recommend appropriate diagnosis of hypertension, but also suggest lifestyle modifications and/or antihypertensive therapy, and a one-month follow-up visit for newly diagnosed hypertensive patients. It was important to review these aspects of the patients' charts to determine if primary care providers were compliant in implementing the guidelines. According to the JNC 8 guidelines, lifestyle modifications include: healthy diet, regular exercise, weight control, and smoking cessation. Each chart was reviewed to assess if the primary care provider charted patient education for each of these individual lifestyle modifications. The primary care provider was given partial credit for each lifestyle modification charted in the plan of care for the patient. For antihypertensive therapy, each chart was reviewed to determine if the primary care provider prescribed pharmacologic therapy at the time hypertension was initially diagnosed which was indicated by a coded yes or no answer on the data collection tool. Specific medication classes, dosages, and frequencies were not collected for

this study, only if antihypertensive therapy was initiated or not initiated, indicated by a coded yes or no answer. To determine if the primary care provider informed the patient to follow-up within one-month to monitor hypertension management, each chart review included reading the primary care provider's plan of care documented in the patient chart. If the primary care provider documented the need for the patient to follow-up in one-month, the chart was considered compliant with the JNC 8 guidelines in that category.

The data collection legend listed each category (gender, age, race/ethnicity, blood pressure classification, comorbidities of diabetes mellitus and/or chronic kidney disease, documented antihypertensive therapy, documented need for one-month follow-up, lifestyle modifications, type of insurance, and type of primary care provider) from the data collection tool. Each category had multiple options with each option corresponding with a number. The number was then documented on the data collection tool for standardization of information.

The patient charts were reviewed in a secure area away from clinic traffic. Team members collected data confidentially in a designated area approved by the office management. Once data collection was complete, the charts were returned to the assigned area or the electronic medical record was closed down and if portable, returned to designated office management for securement. Data was abstracted from the medical records and recorded on the data collection tool utilizing the data collection legend for coding purposes. The collection tool did not contain any identifying information, such as name, medical record number, social security number, birth date, or address. The data from the collection tools were compiled into a Microsoft Excel spreadsheet for analysis and then saved onto a password-protected jump drive which was kept in a secure location made only available to the team members. After completion of the study, the jump drive and all physical data were appropriately discarded.

## **Methods of Data Analysis**

Data collected from the chart reviews were entered on a data collection tool with the use of a coded data collection legend. The data collection tool captured the following information: gender, age, race/ethnicity, blood pressure classification, comorbidities of diabetes and/or chronic kidney disease, documented antihypertensive therapy, documented need for one-month follow-up, lifestyle modifications, type of insurance, and type of primary care provider. Data were then analyzed by a statistician using descriptive statistics with subsequent analyses using IBM SPSS statistical software, version 24 that illustrated comparisons and differences in the data collected. Percentages noting the prevalence of primary care providers abiding by the JNC 8 guidelines in adult patients 18 years of age and older newly diagnosed with hypertension including those with diabetes and/or chronic kidney disease from 2014 to 2018 were recorded. Similarities and differences among primary care providers who used the JNC 8 guidelines were also identified. In addition, data regarding each research question was analyzed. These findings were reported using numbers and percentages and will be further discussed in Chapter IV.

## **Summary**

This chapter examined the design, implementation, data collection, and analysis methods utilized in this study to assess primary care providers' implementation of the JNC 8 guidelines of hypertension. This study was a quantitative, retrospective chart review of 328 patients diagnosed with hypertension according to the ICD 10 diagnostic code of I10 essential (primary) hypertension. Data were confidentially and systematically obtained from a convenience sample of patient charts. The data were analyzed to determine whether or not primary care providers in the southeastern United States were using the JNC 8 guidelines to diagnose and manage the prevalent disease of hypertension. The results of this study were beneficial in determining the

need for further education for primary care providers in relation to the JNC 8 guidelines of hypertension.

## CHAPTER IV

### Presentation of Findings

The prevalence of hypertension continues to be a leading cause of death among patients in the United States (Go AS et al., 2013). In 2014, the Eighth Joint National Committee (JNC 8) released the latest evidence-based recommendations for the diagnosis and treatment of hypertension. With implementation of the JNC 8 guidelines for hypertension, it was hopeful that primary care providers would initiate these guidelines in diagnosing and treating hypertension to decrease the prevalence of bad outcomes related to hypertension (James et al., 2013). Patients with well-controlled blood pressure have a greater opportunity for healthier lifestyles when compared to patients with uncontrolled blood pressure (Hernandez-Vila, 2015). The purpose of this study was to determine if primary care providers implemented the JNC 8 guidelines of hypertension by: (a) diagnosing hypertension, (b) prescribing antihypertensive medication and initiating lifestyle modifications, and (c) documenting the need for a follow-up visit within one-month, all of which are recommendations of the JNC 8 guidelines of hypertension. Chapter four will include data analysis followed by outcomes of data analyses related to the research questions, including significant findings.

#### Profile of Study Participants

Data for this study were collected by method of convenience sampling. A retrospective chart review was performed on 328 charts from six different primary care clinics in the southeastern United States with an ICD 10 diagnostic code, I10 essential (primary) hypertension. The sample included patients over the age of 18 newly diagnosed with hypertension after January 1, 2014, including those with comorbidities of DM and/or CKD. The selected sample was being treated in the six primary care clinics, reflecting primary care provider implementation

of the JNC 8 guidelines of hypertension. The data were manually extracted and recorded on a data collection tool and data collection legend, both developed by the team members. Specific demographic information and primary care provider documentation obtained from each chart included gender, age, race/ethnicity, blood pressure classification, comorbidities of diabetes mellitus and/or chronic kidney disease, documented antihypertensive therapy, documented need for one-month follow-up, lifestyle modifications, type of insurance, and type of primary care provider. The data were compiled in Microsoft Excel using a coded system with subsequent analyses using IBM SPSS statistical software, version 24.

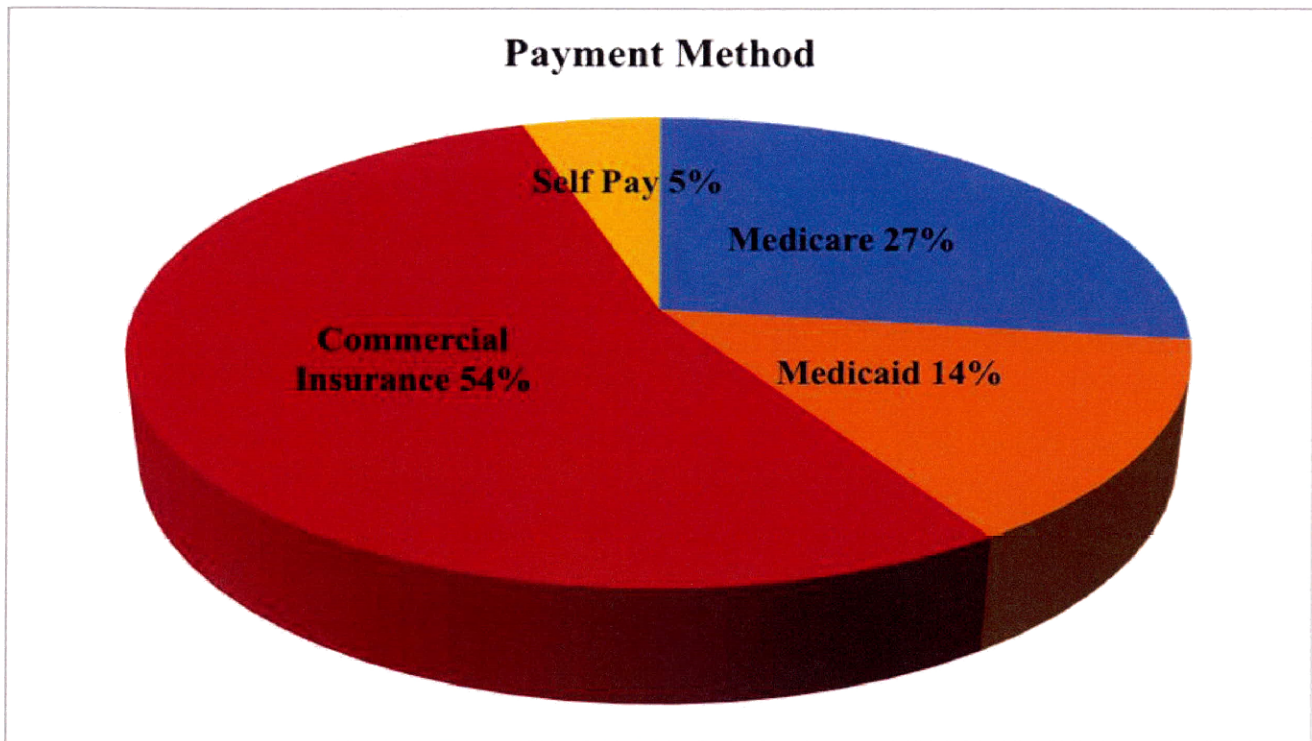
**Gender.** A total of 328 (N=328) patient charts were reviewed. The sample was composed of slightly more male than female patients. Data included 175 (53.4%) male, and 153 (46.6%) female hypertensive patients.

**Age.** For the purpose of this study, only patients over the age of 18 were included because the JNC 8 guidelines address this particular population. Regarding patient age, 213 patients (64.9%) were aged 18-59 years, and 115 patients (35.1%) were aged 60 years and above.

**Race/Ethnicity.** All races and ethnicities were included in this study; however, the only ethnicities represented by the sample were Caucasian, African-American, and Hispanic populations. The percentages of patient ethnicity were 61% (n=200) Caucasian, 38.4% (n=126) African-American, and 0.6% (n=2) Hispanic.

**Insurance.** Patients used a variety of payment methods, including commercial insurance (54.0%, n=177), Medicare (27.1%, n=89), Medicaid (14.0%, n=46), and self-pay (4.9%, n=16). Figure 1 illustrates the findings of payment methods.





*Figure 1.* Patient's payment method for the clinic visit.

**Type of primary care provider.** Two types of primary care providers were included in data collection: physicians (34.1%, n=112) and nurse practitioners (65.9%, n=126). Physician's assistants were included in data collection; however, the clinics where data were collected did not have this type of primary care provider. Figure 2 illustrates the percentages of primary care providers.

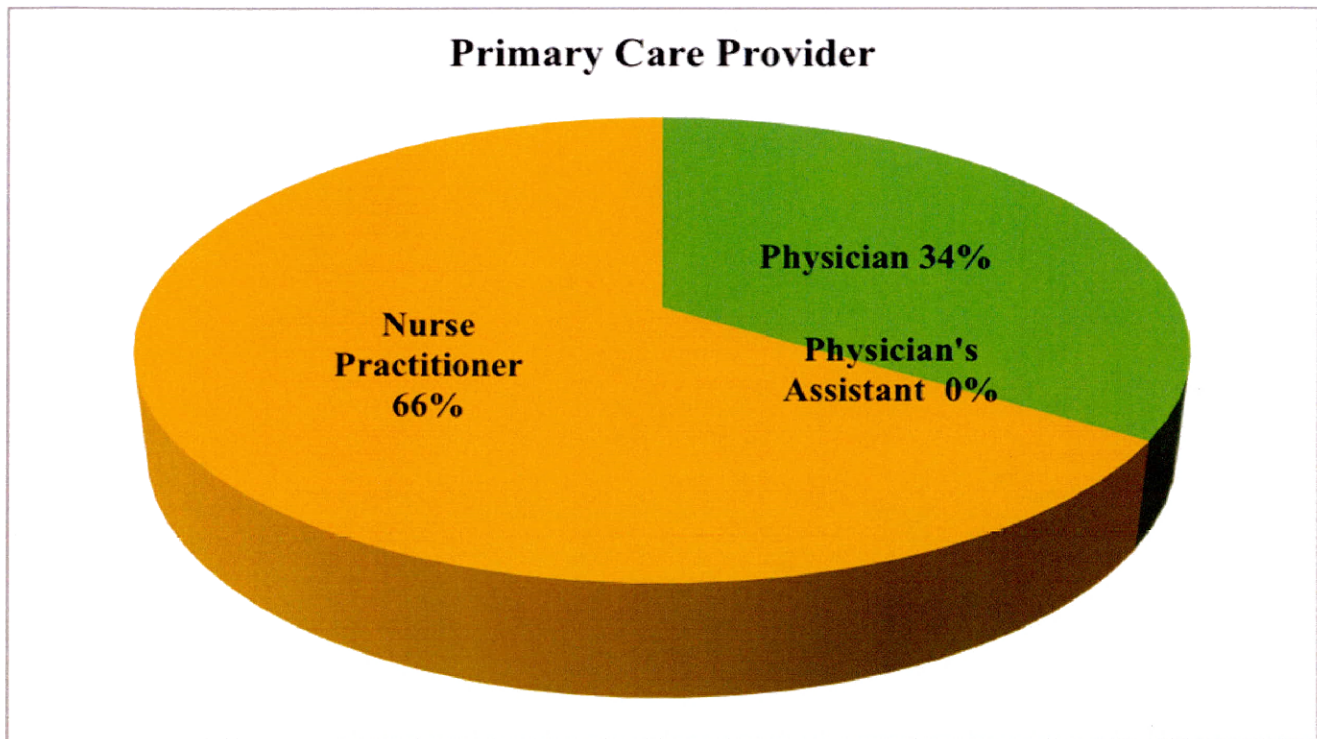


Figure 2. Type of primary care provider who performed patient encounter.

### Statistical Outcomes Regarding Research Questions

The team members collaborated with a professional statistician to organize the information from the data collection tools into a Microsoft Excel spreadsheet. The data were then analyzed by the statistician using IBM SPSS statistical software, Version 24. The following research questions were investigated:

1. Do primary care providers follow the 8th Joint National Committee guidelines in diagnosing hypertension in adult patients, including those that are diagnosed with diabetes mellitus and/or chronic kidney disease?
2. Do primary care providers prescribe an antihypertensive medication and initiate lifestyle modifications based on the 8th Joint National Committee guidelines for those adult patients

diagnosed with hypertension, including those that are diagnosed with diabetes mellitus and/or chronic kidney disease?

3. Do primary care providers who diagnose adult patients with hypertension document the need for a follow-up visit within one-month as recommended by the 8th Joint National Committee guidelines?

**Research question 1.** To collect charts of those patients diagnosed with hypertension, the researchers began by searching by the dates of January 2014 to present time. They were also able to search by the hypertension diagnostic ICD 10 code I10. To separate those diagnosed with hypertension per the JNC 8 guidelines, the researchers reviewed the blood pressure reading when diagnosed according to the primary care provider by ICD 10 code I10. If the blood pressure was greater than 140/90 mmHg for patients <60 years of age or diagnosed with diabetes and/or chronic kidney disease or greater than 150/90 mmHg for patients >60 years of age as in the JNC 8 guidelines, the researchers categorized those patients as hypertensive. For those patients diagnosed with hypertension by ICD 10 code I10 and not according to the JNC 8 guidelines listed above, the researchers categorized those patients as “normal” or non-hypertensive. The term “normal” was utilized because per the JNC 8 guidelines, those patients had a normal blood pressure reading; however, those primary care providers did not utilize the JNC 8 guidelines in diagnosing hypertension. During the chart review of those diagnosed with hypertension, comorbidities were also reviewed. If the patient had a diagnosis of chronic kidney disease or diabetes, that data was recorded. In total, 300 (91.5%) of the patient records reviewed had a blood pressure classification of “hypertension,” and 28 (8.5%) received a blood pressure classification of “normal.” This indicates that the majority of primary care providers from this study followed JNC 8 guidelines when diagnosing hypertension. There was no statistically

significant difference in classification of blood pressure based on comorbidities

( $\chi^2(3, N=328)=6.067, p=0.108$ ), as shown in Table 1.

Table 1

*Diagnosis Rates Based on Comorbidity Status*

Comorbidity	N	JNC 8 Blood Pressure Classification	
		Hypertensive	Non-Hypertensive <sup>1</sup>
Chronic Kidney Disease	9	77.8%	22.2%
Diabetes Mellitus	91	96.7%	3.3%
Diabetes Mellitus and Chronic Kidney Disease	19	89.5%	10.5%
Hypertension Only	209	90.0%	10.0%

<sup>1</sup>Every patient chart reviewed in the study was hypertensive as diagnosed by the primary care provider's documentation of the ICD 10 code I10; however, the patient was non-hypertensive according to JNC 8 guidelines.

**Research question 2.** In addition to diagnosing hypertension according to the JNC 8 guidelines, patient charts were also reviewed to evaluate if the appropriate treatment was initiated according to the guidelines. JNC 8 states each hypertensive patient should have lifestyle modifications initiated and/or antihypertensive therapy if needed (James et al., 2013). Table 2 shows the frequency of primary care provider recommendations of treatment for patients diagnosed with hypertension according to JNC 8 guidelines. Overall, 90.3% were prescribed an antihypertensive medication. Regarding lifestyle modifications, 81.0% were instructed regarding

diet modifications, 38.7% regarding weight control, 66.7% regarding regular exercise, and 12.7% regarding smoking cessation.

There was a statistically significant difference in the prevalence of recommending diet modifications ( $\chi^2(3,N=300)=10.273$ ,  $p=0.016$ ), weight control ( $\chi^2(3,N=300)=10.580$ ,  $p=0.014$ ), regular exercise ( $\chi^2(3,N=300)=12.164$ ,  $p=0.007$ ), and smoking cessation ( $\chi^2(3,N=300)=8.436$ ,  $p=0.038$ ) based on comorbidity status. The differences are shown in Table 2. Patients with a comorbidity were significantly more likely to be instructed regarding diet modifications and weight control. Exercise was recommended more often when a patient was diagnosed with diabetes mellitus, or diabetes mellitus and chronic kidney disease. Recommendations for smoking cessation were most common for patients with chronic kidney disease. There was no statistically significant difference in prevalence of prescribing an antihypertensive medication based on comorbidity ( $\chi^2(3,N=300)=4.805$ ,  $p=0.187$ ).

Table 2

*Medication and Lifestyle Modifications for those Diagnosed with Hypertension According to JNC 8 Guidelines (n=300)*

	N	Lifestyle Modification				
		Antihypertensive Medication	Diet Modifications	Weight Control	Regular Exercise	Smoking Cessation
All Patients	300	90.3%	81.0%	38.7%	66.7%	12.7%
<b>Comorbidity</b>						
Chronic Kidney Disease	7	100.0%	100.0%	42.9%	42.9%	42.9%
Diabetes Mellitus	88	93.2%	89.8%	52.3%	79.5%	11.4%
Chronic Kidney Disease and Diabetes Mellitus	17	100.0%	88.2%	41.2%	76.5%	0.0%
Hypertension Only	188	87.8%	75.5%	31.9%	60.6%	13.3%

**Research question 3.** Along with diagnosis of hypertension and initiation of lifestyle modifications and/or antihypertensive therapy, the researchers evaluated the primary care providers' documentation of patient follow-up. According to the JNC 8 guidelines, follow-up after initial diagnosis of hypertension should occur after one-month (James et al., 2013). Of those diagnosed with hypertension according to the JNC 8 guidelines (n=300), 67.7% documented a need for a one-month follow-up visit. There was a significant difference in frequency of follow-up documentation based on comorbidity ( $\chi^2(3, N=300)=9.549, p=0.023$ ), as shown in Table 3. Those with at least one comorbidity were significantly more likely to have a documented need for one-month follow-up compared to those with neither comorbidity.

Table 3.

*Documentation of Need for One-Month Follow-up Appointment for Those with Hypertension According to JNC 8 Guidelines (N=300)*

	n	Documented Need for One-Month Follow-Up	
		Yes	No
All Patients	300	67.7%	32.3%
<b>Comorbidity</b>			
Chronic Kidney Disease	7	85.7%	14.3%
Diabetes Mellitus	88	75.0%	25.0%
Chronic Kidney Disease and Diabetes Mellitus	17	88.2%	11.8%
Hypertension Only	188	61.7%	38.3%

## Additional Results

Table 4 shows results of diagnosing hypertension based on demographic factors. There were no differences based on gender and race; however, there was a significant difference based on age, with younger patients having higher rates of initial diagnosis of hypertension.

Table 4

### *Diagnosis of Hypertension in Relation to Patient Demographics*

Patient Demographics	n	JNC 8 Blood Pressure Classification	
		Hypertensive	Non-Hypertensive <sup>1</sup>
Age ( $\chi^2(1,N=328)=4.607, p=0.032$ )			
18-59	213	93.9%	6.1%
60 and above	115	87.0%	13.0%
Gender ( $\chi^2(1,N=328)=0.177, p=0.674$ )			
Male	175	90.9%	9.1%
Female	153	92.2%	7.8%
Race ( $\chi^2(2,N=328)=0.300, p=0.861$ )			
Caucasian	200	91.0%	9.0%
African-American	126	92.1%	7.9%
Hispanic	2	100.0%	0.0%

<sup>1</sup>Every patient chart reviewed in the study was hypertensive as diagnosed by the primary care provider's documentation of the ICD 10 code I10; however, the patient was non-hypertensive according to JNC 8 guidelines.



## Summary

Overall, the majority of primary care providers followed JNC 8 guidelines of diagnosing hypertension. This is supported by the initiation of lifestyle modifications and/or antihypertensive therapy when the blood pressure reading was greater than 140/90 mmHg in patients younger than 60-years-old or with diabetes and/or chronic kidney disease and greater than 150/90 mmHg in patients over the age of 60-years-old. The majority of primary care providers initiated antihypertensive therapy; however, all four lifestyle modifications were not documented in the patient chart. Diet modification was the most prominent documented lifestyle modification followed by exercise, weight control, and smoking cessation. The primary care provider was also more likely to diagnose and treat hypertension if comorbidities such as diabetes mellitus and/or chronic kidney disease were present. In regards to the one-month follow-up recommendation, two-thirds of the primary care providers were compliant with the recommendation of the JNC 8 guidelines. Although less compliance of the primary care providers and the JNC 8 guidelines was anticipated, the results of this study will be shared and praised toward primary care providers' knowledge and usage of the latest evidence-based guidelines. Education should be shared in regards to the importance of all four lifestyle modifications of diet, weight control, exercise, and tobacco cessation being documented and applied to the newly diagnosed hypertensive patient.

## CHAPTER V

### Implications

Hypertension is a prevalent condition in primary care and affects approximately 77.9 million people in the United States. If not appropriately treated, hypertension can lead to coronary artery disease, heart failure, stroke, renal failure, and death (Go AS et al., 2013). The Eighth Joint National Committee (JNC 8) distributed evidence-based guidelines for providers to implement into practice for adult patients with hypertension. The JNC 8 guidelines include diagnosis of hypertension according to the blood pressure reading, implementation of lifestyle modifications and/or antihypertensive therapy, and one-month follow-up after initial diagnosis of hypertension. According to the JNC 8 guidelines, accurate diagnosis of hypertension includes a blood pressure reading greater than 140/90 mmHg in patients under the age of 60 or with comorbidities of diabetes mellitus (DM) and/or chronic kidney disease (CKD), and a blood pressure reading greater than 150/90 mmHg in patients 60 years of age and older. For lifestyle modifications, the JNC 8 guidelines include healthy diet, regular exercise, weight control, and smoking cessation. Antihypertensive therapy, depending on the patient's race and comorbidity, should also be prescribed to adult patients with hypertension according to the JNC 8 guidelines. Lastly, the JNC 8 guidelines recommend one-month follow-up for patients newly diagnosed with hypertension to determine efficient management.

The purpose of this study was to determine if primary care providers implemented the JNC 8 guidelines for the diagnosis and treatment of hypertension by evaluating the following research questions:

1. Do primary care providers follow the Eighth Joint National Committee guidelines in diagnosing hypertension in adult patients, including those that are diagnosed with diabetes mellitus and/or chronic kidney disease?
2. Do primary care providers prescribe an antihypertensive medication and initiate lifestyle modifications based on the Eighth Joint National Committee guidelines for those adult patients diagnosed with hypertension, including those that are diagnosed with diabetes and/or chronic kidney disease?
3. Do primary care providers who diagnose adult patients with hypertension document the need for a follow up visit within one month as recommended by the Eighth Joint National Committee guidelines?

Nola Pender's Health Promotion Model (HPM) was the theoretical framework used to guide this study. Once the framework was determined, a retrospective chart review of 328 patients was performed utilizing a data collection tool and data collection legend. A summary of the findings, implications of the results, and recommendations for further research are presented in this chapter.

### **Summary of the Findings**

The sample of this study included 328 patient charts. Each patient was treated in one of six primary care clinics in the southeastern United States between January 1, 2014 to March 31, 2018. These patients were diagnosed with hypertension by the primary care provider as evidence by the ICD 10 diagnostic code, I10 essential (primary) hypertension. The sample included 175 (53.4%) males and 153 (46.6%) females. The ages of the patients included 231 (64.9%) aged 18-59 and 115 (35.1%) aged 60 and older. Ethnicity of the patients was 61% Caucasian, 38.4% African-American, and 0.6% Hispanic. The primary payor source was commercial insurance at

54% (n=177), followed by Medicare at 27.1% (n=89), Medicaid at 14% (n=46), and 4.9% (n=16) were self-pay. Nurse practitioners were the primary care provider for 65.9% of the sample population with physicians managing the care of 34.1%.

Of the charts reviewed, 300 (91.5%) were accurately diagnosed with hypertension according to the JNC 8 guidelines and were therefore categorized as hypertensive. The remaining 28 (8.5%) charts were categorized as “normal” or non-hypertensive because the blood pressure reading was less than the parameters described in the JNC 8 guidelines even though they were linked to the ICD 10 diagnostic code, I10 essential (primary) hypertension by the primary care provider. This phenomenon demonstrated primary care provider noncompliance in adhering to the JNC 8 guidelines; however, overall, the results illustrated the majority of primary care providers utilized the JNC 8 guidelines when diagnosing hypertension.

In addition to accurately diagnosing hypertension according to the blood pressure readings of the JNC 8 guidelines, charts were also reviewed for primary care provider documentation of lifestyle modifications and/or antihypertensive therapy. According to the data, many lifestyle modifications were initiated by primary care providers as evidenced by their documentation in the patient’s plan of care. Eighty-one percent of patients were instructed on a healthy diet, 38.7% concerning weight control, 66.7% regarding regular exercise, and 12.7% were educated on smoking cessation. With antihypertensive therapy, 90.3% were prescribed an antihypertensive medication when diagnosed with hypertension as recommended in the JNC 8 guidelines.

Along with accurate diagnosis of hypertension and documentation of lifestyle modifications and antihypertensive therapy, the JNC 8 guidelines recommend following up with patients in one-month after initial diagnosis of hypertension; therefore, this data was also

collected by the team members. Of the 300 patients accurately diagnosed with hypertension by the JNC 8 guidelines, 67.7% documented the need for a one-month follow-up visit. This finding illustrated the majority of primary care providers complied with this aspect of the JNC 8 guidelines.

Furthermore, additional results regarding demographic factors were collected. There was no difference in primary care provider implementation of the JNC 8 guidelines according to gender and race; however, there was a significant difference based on age, with younger patients having higher rates of accurate hypertension diagnosis. The reason for this could be provider uneasiness in abiding to the higher blood pressure parameter of 150/90 mmHg for patients 60 years of age and older as some previous research studies revealed. Also, there was a significant difference in recommending diet modifications, weight control, and smoking cessation based on the comorbidity status. If patients were diagnosed with comorbidities of DM and/or CKD, the primary care providers were more likely to initiate lifestyle modifications. This finding could be contributed to primary care providers being more mindful of aggressive treatment of hypertension when comorbidities are present because uncontrolled hypertension can contribute to poor patient outcomes.

### **Discussion of the Findings**

This study found 300 patient charts or 91.5% appropriately diagnosed with hypertension according to the JNC 8 guidelines. This reveals the majority of primary care providers have implemented the latest evidence-based guidelines for the diagnosis and treatment of hypertension. A study by Alshehri, Almigbal, Alodhayani, Batais (2017), evaluated family and internal medicine residents' adherence to the JNC 8 guidelines for diagnosing and treating hypertension in Riyadh, Saudi Arabia. A total of 109 residents responded to the questionnaire.

Ninety-eight of the residents were aware of the JNC 8 guidelines used them to diagnose and treat high blood pressure in adults. Adherence of the JNC 8 guidelines varied from 65.1% to 78% for the study performed by Alshehri et al. (2017). Similar to this study, Alshehri et al.'s (2017) study revealed the majority of providers implemented the JNC 8 guidelines; however, in this study, a larger percentage of primary care providers were compliant. This finding could be contributed to the study taking place in the United States of America in comparison to Saudi Arabia. The study performed by Alshehri et al. (2017) also evaluated the residents' awareness of the JNC 8 guidelines, which revealed 90% awareness of the new guidelines. This study did not collect data in regards to the providers' knowledge of the guidelines; however, this would be a suggestion for future research (Alshehri et al., 2017). Overall, the study performed by Alshehri et al. (2017) shared a similar purpose to this study.

Snipelisky, Waldo, and Burton (2015) performed a survey to compare cardiology providers and faculty physicians current prescribing practices to the JNC 8 guidelines of hypertension. These providers were employed by Mayo Clinics in Arizona, Florida, and Minnesota which contrasts the study performed by Alshehri et al. (2017) which was performed in Saudi Arabia. Of the 77 responses from the surveys, Snipelisky et al. (2015) determined participating providers did not follow the JNC 8 guidelines when treating patients aged 60 and above with hypertension. Less than 25% of providers agreed with the systolic blood pressure goal of 150 mmHg for this patient population. Results of Snipelisky et al.'s (2015) study also revealed for patients with comorbidities, such as DM or CKD, providers preferred more strict blood pressure parameters than the recommended JNC 8 blood pressure readings of less than 140/90 mmHg (Snipelisky et al, 2015). In contrast, the majority of the primary care providers from this study followed JNC 8 guidelines when diagnosing hypertension. Another difference in

this study and the study performed by Snipelisky et al. (2015) was the provider's opinion of the JNC 8 guidelines of hypertension. This study did not evaluate primary care providers' opinions of the JNC 8 guidelines, but only revealed whether they were compliant in the recommendations made by the JNC 8 guidelines. This aspect would be another recommendation for further research now that the JNC 8 guidelines have been released for four years versus one year, when Snipelisky et al.'s (2015) study was conducted. Additionally, another comparison in the two studies was the initiation of antihypertensive therapy. Snipelisky et al. (2015) collected data on specific medications prescribed by the providers to treat hypertension whereas this study simply collected data if antihypertensive medications were prescribed upon diagnosing patients with hypertension.

Malik, Uzair, Hussain, and Lubbe (2016) conducted a study for the purpose of determining (a) providers' knowledge of the JNC 8 guidelines in the treatment of hypertension (b) providers' perceptions of the new JNC 8 guidelines, and (c) providers' adherence to the JNC 8 guidelines of hypertension (Malik et al., 2016). Of the 385 providers from Islamabad and Ravalpindi, the researchers determined less than 50% of prescribers were knowledgeable of the treatment for hypertension recommended by the JNC 8 guidelines. Similar to the study performed by Snipelisky et al. (2015), Malik et al. (2016) performed a study from the providers' perspective. This study collected data by reviewing primary care provider documentation rather than obtaining their opinions or knowledge of the guidelines. In regards to this study, the primary care providers may have been unaware of their compliance with the guidelines because the team members did not interview or survey them; however, because of their documentation and plan of care, the majority of primary care providers were compliant with the JNC 8 guidelines in this study. Furthermore, Malik et al. (2016) contrasts this study because its findings revealed less

than 50% of prescribers to be compliant, whereas in this study, 91.5% of primary care providers were compliant in implementing the JNC 8 guidelines of hypertension. Malik et al. (2016) reiterated the need for further research involving the JNC 8 guidelines and also shared implications for further research regarding providers' knowledge and opinions of the JNC 8 guidelines.

The studies conducted by Alshehri et al. (2017), Snipelisky et al. (2015), and Malik et al. (2016) contribute to this study by focusing specifically on the JNC 8 guidelines for hypertension. Each of these studies illustrated the need for further research in relation to the JNC 8 guidelines; therefore, the team members performed this study. This study also focused on multiple aspects of the JNC 8 guidelines such as documented lifestyle modifications, antihypertensive therapy, and follow-up appointments, whereas the previous research studies focused more on antihypertensive therapy and provider opinion and knowledge of the JNC 8 guidelines. Although the majority of primary care providers were compliant in implementing the JNC 8 guidelines during this study, future studies should continue to be performed on this subject matter because of the prevalence of hypertension and potentially poor outcomes of hypertension if not appropriately treated.

### **Limitations of the Research**

Many limitations were identified in this study. These limitations decreased the reliability of the findings and misrepresented parts of the collected data. The data were collected from six primary care clinics in a relatively small geographic area of the southeastern United States, therefore were not representative of a wide population. The search of patient charts was also limited to adult patients diagnosed with hypertension after January 1, 2014 because of the implementation date of the JNC 8 guidelines, and this could have contributed to the smaller sample size for the study. Obtaining a larger sample size in multiple states throughout various



regions of the country would have yielded national representation of primary care providers' implementation of the JNC 8 guidelines.

Another limitation of this study was the documentation of lifestyle modifications by the primary care providers. The JNC 8 guidelines recommend initiation of lifestyle modifications when adult patients are newly diagnosed with hypertension, and they include healthy diet, regular exercise, weight control, and smoking cessation. When reviewing documentation by the primary care providers, it was not common for all four of these lifestyle modifications to be documented. Diet modifications were the most frequently documented, followed by regular exercise, weight control, and lastly, smoking cessation. Some providers may have considered weight control and regular exercise part of diet modifications rather than documenting each of them separately. This aspect could have potentially limited the findings of this study.

The primary care provider documentation of smoking cessation as a lifestyle modification was also a limitation to this study. Although the JNC 8 guidelines include smoking cessation in the recommendations, the data collection tool developed by the researchers did not include a category of the patient's current smoking status. If the patient was not a current smoker, it should not have been expected for the primary care provider to have documented smoking cessation as patient education. With the lifestyle modification of smoking cessation as a part of the JNC 8 guidelines, it was important to obtain the smoking status of the patient; however, this information was not collected by the team members. This limitation potentially decreased the percentage of primary care providers implementing smoking cessation education for hypertensive patients and could have skewed the results of this study.

In addition to sample size and lifestyle modifications, the classification of newly diagnosed hypertensive patients was another limitation of this study. During data collection, the

diagnostic ICD 10 code, I10 essential (primary) hypertension was used to extract the patient sample. This code retrieved charts of all patients diagnosed with hypertension rather than differentiating patients newly diagnosed with hypertension. Therefore, the team members reviewed the patient chart for current antihypertensive therapy or a diagnosis of hypertension on previous encounters. This aspect of data collection made it difficult to distinguish between patients who were newly diagnosed with hypertension in comparison to patients who have previously been diagnosed with hypertension which could have also led to potential data discrepancies.

Lastly, the results of this study may have been contributed to the date of the patient encounter which was a limitation and could have manipulated the findings. Patient charts from January 1, 2014 to March 31, 2018 were reviewed for primary care provider implementation of the JNC 8 guidelines. If the team member collected charts with patient encounters in 2017 and 2018, the results may have been more compliant than the charts with patient encounters closer to the date of the JNC 8 guidelines initiation in 2014. Overtime, primary care providers are more likely to become more aware of the latest guidelines; therefore, the compliance of the primary care providers found in this study could be contributed to collection of charts being obtained closer to 2018 than 2014. Unfortunately, the date of the patient encounter was not collected for this study.

## **Conclusions**

The purpose of this study was to assess primary care providers' implementation of the JNC 8 guidelines of hypertension. Overall, the majority of primary care providers were implementing the JNC 8 guidelines for the diagnosis of hypertension in adult patients. To diagnose hypertension according to the JNC 8 guidelines, the blood pressure reading is greater

than 140/90 mmHg in patients under the age of 60 or diagnosed with DM and/or CKD and a blood pressure reading greater than 150/90 mmHg in patients 60 years of age and older. Ninety-two percent of primary care providers diagnosed patients according to these blood pressure readings.

In addition to diagnosing hypertension according to the JNC 8 guidelines, documentation of lifestyle modifications, antihypertensive therapy, and patient follow-up were also reviewed to determine primary care providers' compliance. The documentation of lifestyle modifications was not as accurate as the diagnosis of hypertension. Diet modification was the most documented lifestyle modification with regular exercise, weight control, and smoking cessation following behind. Some providers may have considered weight control and regular exercise part of diet modifications rather than documenting each of them separately. Smoking cessation was the least documented lifestyle modification, and the team members attributed this to not all patients being active smokers. If the patient was not an active smoker, the primary care provider would not educate the patient on smoking cessation.

The initiation of antihypertensive therapy was another factor that assessed primary care providers' implementation of the JNC 8 guidelines and was found to be prescribed for 90.3% of patients. This result revealed the majority of primary care providers were compliant in prescribing antihypertensive therapy to newly diagnosed patients with hypertension. One-hundred percent of patients diagnosed with hypertension and CKD or hypertension, DM, and CKD were prescribed antihypertensive medication by primary care providers. Ninety-three percent of patients diagnosed with hypertension and DM were also prescribed antihypertensive medication. These results indicated primary care providers were more likely to prescribe antihypertensive medication for patients with comorbidities rather than the diagnosis of

hypertension alone. This could be because primary care providers are more aggressive with the treatment of hypertension when patients suffer from comorbidities that can worsen with uncontrolled hypertension.

Along with the accurate diagnosis of hypertension and documentation of lifestyle modifications and antihypertensive therapy, the documentation for one-month follow-up was also reviewed in each patient chart to determine primary care provider implementation of the JNC 8 guidelines. Of the 300 patients who were accurately diagnosed with hypertension, 67.7% were instructed to follow-up in one-month from the current visit. Similar to the results of antihypertensive therapy, primary care providers were more likely to instruct patients to follow-up in one-month if comorbid illnesses were present. Data revealed documented need for one-month follow-up was recommended 85.7% for patients with hypertension and CKD and 88.2% for patients with hypertension, DM, and CKD. This recommendation was least compliant in patients who were diagnosed with hypertension only with the result of 61.7%. These findings could also contribute to primary care providers being more attentive to hypertensive patients who suffer from comorbidities, such as DM and/or CKD, that worsen with uncontrolled hypertension. Overall, this study concluded primary care providers implement the JNC 8 guidelines when diagnosing and treating hypertension; however, improvement of patient education on specific lifestyle modifications should be more specific.

### **Implications**

There are many implications that can be made from the results of this study. Although the majority of primary care providers utilized the JNC 8 guidelines to diagnose and treat patients with hypertension, it is important for all providers to continue to diagnose and treat hypertensive patients according to the JNC 8 guidelines because they are the latest recommendations of

evidence-based research in regards to hypertension management. The Joint National Committee has been publishing evidence-based guidelines since 1977; however, many previous studies found lack of knowledge and implementation by the providers of the JNC 8 guidelines (Malik et al. 2016). This indicates the need for primary care providers to remain up-to-date on the latest guidelines for improved patient outcomes.

**Implications for clinical practice.** Uncontrolled hypertension has been associated with many negative factors such as coronary artery disease, heart failure, stroke, renal failure, and death (Go AS et al., 2013). The results from this study demonstrated implementation of the latest guidelines for the management of hypertension, therefore, illustrating a positive outlook on clinical practice. The majority of primary care providers from this study were nurse practitioners indicating their clinical practice is mostly compliant with the JNC 8 guidelines. Hypertension is a prevalent diagnosis that nurse practitioners routinely diagnose, treat, and manage in clinical practice, and the JNC 8 guidelines provide primary care providers with a detailed, step-by-step approach to managing hypertension. Even though the response from this study was positive for the diagnosis and treatment of hypertension by primary care providers according to the JNC 8 guidelines, hypertension management will always be a prevalent implication to clinical practice because of its significance in the medical field.

**Implications for education.** The results of this study provide implications for education among primary care providers. Primary care providers face the challenge of staying educated on the current guidelines for the diagnosis, management, and treatment for hypertension while also educating patients on the importance of these aspects of their illness. The findings of this study revealed a need for specific lifestyle modifications to be reviewed with patients upon initial diagnosis of hypertension but also throughout the treatment of hypertension as the JNC 8

guidelines suggest. For primary care providers to remain educated on the latest guidelines, continuing education regarding the JNC 8 guidelines would help spread the knowledge of the latest evidence-based research for this prevalent condition.

**Implications for research.** There are many implications for future research that can be drawn from the conclusions of this study. Although the majority of primary care providers were implementing the JNC 8 guidelines with hypertensive patients, the review of literature was limited. The JNC 8 guidelines also differ greatly from the previous JNC 7 guidelines, therefore, a larger sample size of patient charts in a larger setting would be more indicative of the implementation of the JNC 8 guidelines by primary care providers on a national level. Previous studies regarding the JNC 8 guidelines also revealed a need for further research in relation to these guidelines because of the controversy found in the changes between the JNC 7 and JNC 8 guidelines.

**Implications for nursing theory.** Nola Pender's HPM was used to guide this study. This theory provided a framework for the team members to understand possible factors that affect patients' decisions regarding healthcare. The model focuses on encouraging wellness through a movement toward personal accountability in personal health practices. Pender bases her theory on the idea that individuals who are motivated will modify their lifestyle behaviors to attain certain goals and be in control of their own health. The focus throughout this study was the importance of primary care providers implementing the JNC 8 guidelines of hypertension and part of this included patient education on lifestyle modifications. If patients are made aware of the severity of hypertension, they may be more motivated to implement lifestyle modifications into their behavior as well as be compliant in prescribed antihypertensive therapy.

## **Recommendations**

Based on the results of this study, the following recommendations are made for primary care providers:

- All primary care providers should utilize the JNC 8 guidelines of hypertension because they are the latest evidence-based guidelines and recommended by the American Heart Association for utilization by all primary care providers (American Heart Association, 2017).
- Information regarding the JNC 8 guidelines should be readily available to primary care providers including the offering of continuing education units on the subject matter.
- Replication of this study with a larger population and sample size of primary care providers' implementation of the JNC 8 guidelines would reveal further needs for education and also promote the latest evidence-based research for hypertension management.
- Further research on the outcomes of hypertensive patients treated according to the JNC 8 guidelines in comparison to the JNC 7 guidelines would reveal beneficial data in regards to patient results.
- Incorporation of the JNC 8 guidelines in electronic medical records would be beneficial to primary care providers and increase knowledge of the guidelines including appropriate diagnosis of hypertension, recommended treatment, and patient follow-up.

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## APPENDIX A

### JNC 8 RECOMMENDATIONS FOR MANAGEMENT OF HYPERTENSION

#### **Recommendation 1**

In the general population aged  $\geq 60$  years, initiate pharmacologic treatment to lower blood pressure (BP) at systolic blood pressure (SBP)  $\geq 150$  mm Hg or diastolic blood pressure (DBP)  $\geq 90$  mm Hg and treat to a goal SBP  $< 150$  mm Hg and goal DBP  $< 90$  mm Hg. (Strong Recommendation – Grade A)

#### Corollary Recommendation

In the general population aged  $\geq 60$  years, if pharmacologic treatment for high BP results in lower achieved SBP (eg,  $< 140$  mm Hg) and treatment is well tolerated and without adverse effects on health or quality of life, treatment does not need to be adjusted. (Expert Opinion – Grade E)

#### **Recommendation 2**

In the general population  $< 60$  years, initiate pharmacologic treatment to lower BP at DBP  $\geq 90$  mm Hg and treat to a goal DBP  $< 90$  mm Hg. (For ages 30-59 years, Strong Recommendation – Grade A; For ages 18-29 years, Expert Opinion – Grade E)

#### **Recommendation 3**

In the general population  $< 60$  years, initiate pharmacologic treatment to lower BP at SBP  $\geq 140$  mm Hg and treat to a goal SBP  $< 140$  mm Hg. (Expert Opinion – Grade E)

#### **Recommendation 4**

In the population aged  $\geq 18$  years with chronic kidney disease (CKD), initiate pharmacologic treatment to lower BP at SBP  $\geq 140$  mm Hg or DBP  $\geq 90$  mm Hg and treat to goal SBP  $< 140$  mm Hg and goal DBP  $< 90$  mm Hg. (Expert Opinion – Grade E)

### **Recommendation 5**

In the population aged  $\geq 18$  years with diabetes, initiate pharmacologic treatment to lower BP at SBP  $\geq 140$  mm Hg or DBP  $\geq 90$  mm Hg and treat to a goal SBP  $< 140$  mm Hg and goal DBP  $< 90$  mm Hg. (Expert Opinion – Grade E)

### **Recommendation 6**

In the general nonblack population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic, calcium channel blocker (CCB), angiotensin-converting enzyme inhibitor (ACEI), or angiotensin receptor blocker (ARB). (Moderate Recommendation – Grade B)

### **Recommendation 7**

In the general black population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic or CCB. (For general black population: Moderate Recommendation – Grade B; for black patients with diabetes: Weak Recommendation – Grade C)

### **Recommendation 8**

In the population aged  $\geq 18$  years with CKD, initial (or add-on) antihypertensive treatment should include an ACEI or ARB to improve kidney outcomes. This applies to all CKD patients with hypertension regardless of race or diabetes status. (Moderate Recommendation – Grade B)

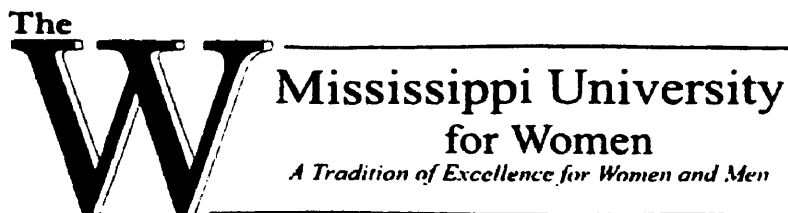
### **Recommendation 9**

The main objective of hypertension treatment is to attain and maintain goal BP. If goal BP is not reached within a month of treatment, increase the dose of the initial drug or add a second drug from one of the classes in recommendation 6 (thiazide-type diuretic, CCB, ACEI, or

ARB). The clinician should continue to assess BP and adjust the treatment regimen until goal BP is reached. If goal BP cannot be reached with 2 drugs, add and titrate a third drug from the list provided. Do not use an ACEI and an ARB together in the same patient. If goal BP cannot be reached using only the drugs in recommendation 6 because of a contraindication or the need to use more than 3 drugs to reach goal BP, antihypertensive drugs from other classes can be used. Referral to a hypertension specialist may be indicated for patients in whom goal BP cannot be attained using the above strategy or for the management of complicated patients for whom additional clinical consultation is needed. (Expert Opinion – Grade E)

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL



Provost and Vice President for Academic Affairs  
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February 28, 2018

Terri Hamill, Ph.D.  
Mississippi University for Women  
College of Nursing and Health Sciences  
1100 College Street, MUW- 910  
Columbus, Mississippi 39701

Dear Dr. Hamill:

I am pleased to inform you that the members of the Institutional Review Board (IRB) have reviewed the following proposed research and have approved it as submitted:

<b>Name of Study:</b>	Implementation of the Eighth Joint National Committee Guidelines of Hypertension by the Primary Care Provider
<b>Research Faculty/Advisor:</b>	Terri Hamill, Ph.D.
<b>Investigators:</b>	Meagan Hillhouse, Haley Murphy, Shelly Parker, Elaina Ponder, Emily Stidham and Lauren Tutor

I wish you much success in your research.

Sincerely,

Thomas C. Richardson, Ph.D.  
Provost and Vice President for Academic Affairs

TCR/tc

pc: Tammie McCoy, Institutional Review Board Chairman

## APPENDIX C

### LETTER OF INFORMED CONSENT

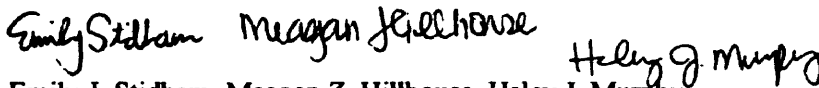
To:

We are graduate students in the Family Nurse Practitioner program at Mississippi University for Women in Columbus, Mississippi. As a program requirement, we are conducting a retrospective chart review to assess implementation of the Eighth Joint National Committee Guidelines of Hypertension by primary care providers. We will be collecting data regarding the use of these guidelines in patients 18 years and older having a recorded ICD-10 diagnosis code of I10, ranging from 2014 to present. We are requesting permission to review medical records within your practice that meet these criteria. We are aware that we will need to maintain the confidentiality of all information collected from the medical records.

We agree to undergo or consent to any HIPPA requirements set forth by your practice regarding patient privacy and confidentiality. The data collected from each chart will be recorded per a Data Collection Worksheet to be kept on a confidential electronic flash drive stored in a secure location, with access only to the researchers. At termination of the research project, this information will be destroyed by deletion of the drive, per HIPPA guidelines. No clinic or patient identifiers will be used in the study.

Your participation in this study is strictly voluntary. You may withdraw your consent and participation in this study at any time. The result of the study will be made available to you upon completion and may have such beneficial use as a quality assurance measure for your practice. If you have any questions concerning this study, please contact the following: Dr. Teresa Hamill (committee chair) at (662) 329-7323.

Sincerely,

  
Emily J. Stidham, Meagan Z. Hillhouse, Haley J. Murphy,

  
Shelly R. Parker, Elaina A. Ponder, Lauren A. Tutor

I have read the above letter of consent and agree to the utilization of this clinic for the above-mentioned research project. I understand that HIPPA regulations will be strictly followed and the confidentiality of each chart chosen will be maintained. I also understand that the results of the study will be made available to me at the project's end.





## APPENDIX E

### DATA COLLECTION LEGEND

**Initials of Researcher:** \_\_\_\_\_

**Date of Chart Review:** \_\_\_\_\_

**Clinic #:** \_\_\_\_\_

- 1. Age:**
  - 18-59 (1)
  - 60 and above (2)
- 2. Gender:**
  - Male (1)
  - Female (2)
- 3. Race/Ethnicity:**
  - Caucasian (1)
  - African American (2)
  - Hispanic (3)
  - Asian (4)
  - Other (5)
- 4. Blood pressure classification according to JNC 8:**
  - Normal (1)
  - Hypertensive (2)
- 5. Diagnosis of Diabetes Mellitus (DM) and/or Chronic Kidney Disease (CKD):**
  - No (1)
  - Chronic Kidney Disease (2)
  - Diabetes Mellitus (3)
  - Both (4)
- 6. Documented pharmacologic management:**
  - Yes (1)
  - No (2)
- 7. Documented need for one-month follow-up appointment:**
  - Yes (1)
  - No (2)
- 8. Documented lifestyle modifications:**
  - Diet Modifications (1)
  - Weight Control (2)
  - Regular Exercise (3)
  - Smoking Cessation (4)
- 9. Insurance:**
  - Medicare (1)
  - Medicaid (2)
  - Commercial (3)
  - Self-pay (4)
- 10. Provider:**
  - Physician (1)
  - Physician's Assistant (2)
  - Nurse Practitioner