PROVIDER ADHERENCE TO JNC 8 PHARMACOLOGICAL GUIDELINE RECOMMENDATIONS IN AFRICAN AMERICAN ADULTS DIAGNOSED WITH HYPERTENSION

by

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As members of the DNP Project Committee, we certify that we have read the DNP Project prepared by Tranise Hamilton Goodlow entitled Provider Adherence to JNC 8 Pharmacological Guideline Recommendations in African American Adults Diagnosed with Hypertension and recommend that it be accepted as fulfilling the DNP Project requirement for the Degree of Doctor of Nursing Practice.

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Final approval and acceptance of this DNP Project is contingent upon the candidate's submission of the final copies of the DNP Project to the Graduate College.

I hereby certify that I have read this DNP Project prepared under my direction and recommend that it be accepted as fulfilling the DNP Project requirement.

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SIGNED: Tranise Hamilton Goodlow

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ABSTRACT

Background: In the United States, one-third of adults have hypertension (HTN). Among African American (AA) adults, 43% of men and 45.7% of women have HTN. HTN in the AA adult population is more severe and occurs earlier in life compared to Caucasian adults, putting them at increased risk for cardiovascular events and renal disease. The Eighth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8) Guideline Recommendations 7 and 8 were developed to aid in appropriate treatment and management of hypertensive AA adults.

Purpose: The purpose of this Doctor of Nursing Practice (DNP) project was to improve the care, management, and outcomes of hypertensive AA adults by identifying current JNC 8 guideline prescribing patterns among a sample of hospitalized patients. The first project aim was to determine provider-prescribing rates of thiazide diuretics (TDs) and calcium channel blockers (CCBs) in newly diagnosed AA adults with HTN. The second project aim was to determine if AA adults previously diagnosed with HTN were currently prescribed TD and/or CCB medications.

Methods: A retrospective medical record review of AA adult patients with a new HTN diagnosis or previously diagnosed with HTN was selected for this project. Participants were discharged from Medical City Dallas between 01/01/2017 and 03/31/2017.

Results: In newly diagnosed participants with HTN, none were prescribed a TD (0%) and two were prescribed a CCB (40%). In previously diagnosed participants with HTN, 30 participants (16.3%) were prescribed a TD and/or CCB upon admission and 29 participants (15.76%) were prescribed a TD and/or CCB upon discharge. Among prescribing providers, beta

blockers and *other* class hypertensive medications (i.e., furosemide, hydralazine, clonidine, and spironolactone) were most widely ordered for participants.

Conclusions: The results of this DNP project display low provider compliance rates to guideline-recommended pharmacological therapy AA adults. This outcome highlights several potential reasons for the low adherence rates, including lack of provider documentation, lack of provider rationale for treatment selections, provider knowledge of HTN CPGs, and data analysis of prescribed medications. These factors present the opportunity for further research to identify the root cause of low compliance.

CHAPTER ONE: PROJECT OVERVIEW

Hypertension Challenges

Organ, hormone, and vascular dysfunction affect normal physiology; irregularities of these structures can lead to hypertension (HTN). This primarily includes abnormalities in the heart, kidneys, autonomic nervous system, antidiuretic hormone (ADH), and the vascular endothelial lining (Cain & Khalil, 2002; Singh, Mensah, & Bakris, 2010; Sudano, Roas, & Noll, 2011). Primary, or essential, is the most common form of HTN. Variations in genetic makeup and environmental factors determine the degree to which an individual has HTN and increased blood pressure (BP) readings (Butler, 2010; Singh, Mensah, & Bakris, 2010). The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure [JNC 7] and the American Heart Association (AHA) have identified HTN in adults as a systolic BP of 140-159 mmHg or a diastolic BP of 90-99 mmHg (AHA, 2016b; Chobanian et al., 2004). Approximately one-third of the American adult population have HTN (Centers for Disease Control and Prevention [CDC], 2016; Go et al., 2013). Within the African American (AA) adult population, approximately 44.35% individuals have HTN (CDC, 2016). Moreover, HTN within the AA adult population is more severe compared to the Caucasian population (Go et al., 2013). HTN can lead to potentially fatal diseases including cerebral vascular accidents (CVAs), myocardial infarctions (MIs), heart failure (HF), chronic kidney disease (CKD), and end stage renal disease (ESRD) (CDC, 2014b; Mozaffarian et al., 2016). Additionally, poorly controlled HTN has cost billions of dollars and will continue to grow (Mozaffarian et al., 2016). Several present treatment challenges make management of HTN difficult. These obstacles include socioeconomic status, patient comorbidities, patient awareness,

patient health literacy, provider communication, patient pharmacological adherence, and clinical inertia (Alexander, Gordon, Davis, & Chen, 2003; CDC, 2012; Eaddy, Shah, Lunacsek, & Standford, 2008; Fortuna et al., 2015; Lavoie, Rash, & Campbell, 2017; Leng, Jin, Li, Chen, Jin, 2015; Lam, 2011; Oliveria, Chen, McCarthy, Davis, & Hill, 2005; Peacock & Krousel-Wood, 2017; Rimando, 2015; Sessoms, Reid, Williams, & Hinton, 2015; Weekes, 2012). Moreover, current practice displays disproportionately low HTN medication adjustments in patients that require antihypertensive therapy. According to Mu and Mukamal (2016) only 11% of 88 million hypertensive patients received medication adjustments when seeking ambulatory care in the United States. In a similar study conducted by Sessoms et al (2015), one third of participants needed HTN medication adjustments, yet 15.2% actually had pharmacological adjustments made to their regimen.

Practice Gap

The existing research evaluating clinical practice guidelines (CPGs) in HTN management has focused on outpatient and primary care practices. Although there are limited studies conducted on the inpatient perspective of HTN CPG implementation, none specifically addresses the at-risk AA adult population.

Problem Statement

To establish if healthcare providers are prescribing thiazide diuretics (TDs) and/or calcium channel blockers (CCBs) upon discharge to AA adults with a new admitting diagnosis of HTN and if AA adults admitted with a current diagnosis of HTN are presently prescribed TDs or CCBs.

Conceptual Framework

A systematic review conducted by Tabak, Khoong, Chambers, and Brownson (2012) identified theories and frameworks which are essential in bridging the gap between research and practice. Further, the application of evidence-based research requires dissemination for proper implementation to occur (Tabek et al., 2012). Selection of an appropriate conceptual framework is an instrumental factor in adopting research innovations. A framework's construct must coincide with the overall goal of the evidence-based practice (Wisdom, Chor, Hoagwood, & Horwitz, 2014). Additionally, a framework must be multidimensional with manifestations of evidence, context, facilitation, and function, to support effective implementation (Kitson, Harvey, & Cormack, 1998).

The Promoting Action on Research Implementation in Health Services (PARiHS) proposes relationships between evidence, context, and facilitation to achieve successful implementation of research into practice (National Collaborating Centre for Methods and Tools [NCCMT], 2011). This middle range theory facilitates development of dynamic and interrelated elements with a foundation of evidence obtained via research (Rycroft-Malone et al., 2013). PARiHS was developed in 1998 with the purpose of "working with clinicians in helping them to improve practice, introduce new ideas and implement guidelines" (Kitson et al., 2008). The PARiHS framework is ideal in discovering if adherence of the Eighth Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8) pharmacological guidelines exists in the AA adult population due to its ability to display interrelationships amongst elements; this creates an organic tool that practitioners and

organizations can implement into practice (Kitson et al., 2008). See Table 1 for more detail of the PARiHS framework applied to this doctor of nursing practice (DNP) project.

TABLE 1. *Promoting Action on Research Implementation in Health Services (PARiHS) Framework*

PARiHS Element	Components	In This Project
Evidence	• Research must be translated and adapted within the organization's context • Practitioner knowledge, expertise, and experience • Intended population/community	• Medical City Dallas (MCD) adheres to current evidence based practices. MCD also has a research department and a nursing research committee; the committee meets monthly and has ongoing research projects in the facility with the goal of implementing new, evidence base research conducted by bedside nurses. • MCD employs physicians, nurse practitioners, and physician assistants that practice in many specialties. • MCD treats a patient population that is inclusive of hypertensive AA adult clients.
Context	• Environment of proposed change • Culture of the environment • Organizational structure and evaluation • Resources of implementation	• MCD has several non-critical adult units, including medical surgical and telemetry. • Medical City Dallas (MCD) promotes a culture of 'always' as well as cost effective care to improve human life. • There is no formal organizational structure to evaluate JNC 8 guideline adherence or implementation. • Patient health histories and medication reconciliations are obtained upon hospital admission. Vital signs are recorded and trended throughout the patient's length of stay.

TABLE 1 – *Continued*

PARiHS Element	Components	In This Project
Facilitation	• Identify need and rationale for change • Support to implement change • Enable individuals to analyze, reflect, and change attitudes and behavior • Identify key competencies • Knowledge translation	• Continued increase in hypertensive AA adults and development of comorbidities secondary to HTN. • MCD is receptive to implementing change, as is the research department; the challenge is engaging bedside nurses and healthcare providers. • Present current JNC 8 guidelines to individuals to enable analysis, reflection, and attitude/behavior changes towards recommendations. • Key competencies include knowledge of BP, HTN, at risk populations, appropriate treatments, and knowledge of guidelines. • Collaborating with healthcare professionals on patient HTN management and supplying knowledge regarding HTN to patients appropriately.

Successful Implementation = function of (Evidence, Context, Facilitation)

Adopted from National Collaborating Centre for Methods and Tools (2011). *PARiHS framework for implementing research into practice*. Hamilton, ON: McMaster University. Retrieved March 5, 2017, from http://www.nccmt.ca/resources/search/85.

Literature Review

A December 2016 literature search from 2006 to 2016 was conducted in PubMed using the following key words: African American, hypertension, management, treatment, and/or consequences. Exclusion criteria included articles not in English and participants younger than 18 years of age. This search produced 1,402 results and four articles were utilized for synthesis. These articles were appropriate due to exploring and comparing medications effective in AAs

and assessments of AAs with HTN and elevated BPs; these articles also displayed a variety of research designs.

Also in December 2016 a literature search from 2006 to 2016 was conducted on PubMed using the following key words and phrases: provider guideline adherence, hypertension, and/or African American hypertension prescribing. Exclusion criteria included articles not in English and participants younger than 18 years of age. This yielded 91 results and four articles were used for synthesis. These articles were suitable due to evaluating provider communication and HTN treatment in AA adults as well as examining prescribing patterns in AA adults with HTN.

Summary

Current research supports TDs and CCBs as first line pharmacological interventions in hypertensive AA adults. Findings also discovered other drug classes (i.e., ACE Is, BBs) are not as effective in controlling HTN in AAs comparted to TDs and CCBs. However, ACE Is are commonly prescribed to hypertensive AA adults, despite their association with MIs, CVAs, and HF; additionally, ACE Is compared to BBs have no significant benefits (Bangalore et al., 2015). Regardless of their decrease efficacy, ACE Is are the most commonly prescribed antihypertensive in combination with other antihypertensives, such as diuretics, CCBs, and BBs. Providers most frequently prescribe ACE Is or ARBs for HTN management in AA adults with HTN and DM, which is in accordance with current CPGs (Yazdanshenas et al., 2014).

Patients prescribed diuretics to manage their HTN are generally noncompliant despite diuretics being effective in lowering systolic BPs (Gerber et al., 2013). When AA elderly adults present to the emergency department with HTN all patients are not receiving reassessments of their BPs, referrals, or dietary instructions upon discharge (Baumann et al., 2009).

Findings between providers and hypertensive AA adult patients display poor communication and relationships. AA patients typically have shorter visits with healthcare providers compared to Caucasian patients. The shorter visits AA patients experience also include decreased biomedical, psychosocial and rapport building than visits with Caucasian patients (Cene Rofer, Carson, Miller, & Cooper, 2009). However, providers prescribe antihypertensive medications to AAs and Caucasians at the same rate, but believed AAs would be less compliant with treatment. Healthcare providers did appropriately consider a patient's race when selecting antihypertensive pharmacological therapy (Rathore, Ketcham, Alexander, & Epstein, 2009).

In individuals with abnormal laboratory values and elevated BPs, but an asymptomatic presentation, most patients were not ordered or discharged with antihypertensive medications (Nishijima, Paladino, & Sinert, 2010). Younger, AA, and male patients are less likely to have repeat BP measurement performed (Lehrmann et al., 2017). (See Table 2 for summary of literature on the topic.)

TABLE 2. *Literature Review Summary*

Year	Authors Title Journal	Purpose	Design	Sample	Results
2015	Bangalore, Ogedegbe, Gyamfi, Guo, Roy, Goldfeld, Torgersen, Capponi, Phillips, Shah Outcomes with Angiotensin-converting Enzyme Inhibitors vs Other Antihypertensive Agents in Hypertensive Blacks The American Journal of Medicine	To establish efficacy of Angtiotensin-converting enzyme inhibitors (ACE Is) versus other antihypertensive agents.	Cohort study	434,646 hypertensive black patients between 18 and 89 years of age prescribed an ACE I, beta blockers (BBs), thiazide diuretic, or calcium channel blocker (CCB) for at least 6 months.	ACE Is vs CCBs and thiazide diuretics: ACE Is are associated with higher risk of primary outcome, myocardial infarction, stroke, heart failure. ACE Is vs BBs: no significant difference.

TABLE 2 – *Continued*

Year	Authors Title Journal	Purpose	Design	Sample	Results
2014	Yazdanshenas, Bazargan, Orum, Loni, Mahabadi, Husaini Prescribing Patterns in the Treatment of Hypertension among Underserved African American Elderly Ethnicity & Disease	Examination of the patterns of pharmacological treatments in elderly hypertensive African Americans (AAs); additional evaluation of hypertension guideline recommendation compliance and variation in treatment of hypertensive AAs with diabetes mellitus (DM) and chronic kidney disease (CKD).	Cross-sectional investigation	341 hypertensive AA adults aged 65 to 94 years of age.	Among participants taking two or more drug classes, ACE Is or ARB were used 76% in combination of the following agents: diuretics 60%, CCBs 63%, and BBs 61%. In hypertensive and DM/CKD participants ACE Is and ARBs were most commonly prescribed.
2013	Gerber, Mann, McDonald, Chiu, Sridharan, Feldman Diuretic Use in Black Patients With Uncontrolled Hypertension American Journal of Hypertension	Examining diuretic use in patients with uncontrolled hypertension.	Single cohort	658 black participants ranging from age 21 to 80 years with hypertension receiving treatment from a home health organization.	94.5% of participants were taking antihypertensive medication; 46% were prescribed a diuretic and 12% were taking a diuretic. Individuals not taking a diuretic were more likely to have a systolic blood pressure greater than or equal to 160mmHg and a higher average diastolic blood pressure.

TABLE 2 – *Continued*

Year	Authors Title Journal	Purpose	Design	Sample	Results
2010	Nishijima, Paladino, Sinert Routine testing in patients with asymptomatic elevated blood pressure in the ED The American Journal of Emergency Medicine	The prevalence of abnormal laboratory values in asymptomatic patients with elevated BP that led to hospital admission and decreased renal function.	Cross-sectional study using a convenience sample	167 adult patients.	Oral antihypertensive medications were given to 69 (41%) of patients in the emergency department. Upon discharge 53 (32%) patients were prescribed antihypertensive medications. 150 (90%) patients had one or more abnormal laboratory value; 12 (7%) patients with abnormal laboratory values were admitted to the hospital.
2009	Baumann, Cienki, Cline, Egging, Lehrmann, Tanabe Evaluation, management, and referral or elderly emergency department patients with elevated blood pressure Blood Pressure Monitoring	To determine blood pressure (BP) reassessment rates, evaluation, and outpatient referral rates of elderly emergency department patients with elevated BP.	Retrospective cohort	267 participants 60 years of age and older.	Of the 267 patients, 198 (74%) underwent reassessment of their BP. At discharge 29 patients (12%) received referrals, 17 (7%) were provided pharmacological revisions via antihypertensive prescriptions, and 10 (4%) were instructed on lifestyle and dietary modifications.

TABLE 2 – *Continued*

Year	Authors Title Journal	Purpose	Design	Sample	Results
2009	Cene', Rofer, Carson, Miller, Cooper The Effect of Patient Race and Blood Pressure Control on Patient-Physician Communication Journal of General Internal Medicine	To determine if being AA and having poorly controlled BP effects patient/physician communication more than either condition independently.	Cross-sectional study data from a randomized controlled trial	226 black and white adults.	Blacks with uncontrolled BP have shorter visits with decrease biomedical, psychosocial, and rapport building statements compared to whites with controlled BP. Blacks with controlled BP experience shorter visits and less communication with physicians than whites with controlled BP. There is no significant communication differences between whites with uncontrolled BP versus controlled BP.

TABLE 2 – *Continued*

Year	Authors Title Journal	Purpose	Design	Sample	Results
2009	Rathore, Ketcham, Alexander, Epstein Influence of Patient Race on Physician Prescribing Decisions: A Randomized On-Line Experiment Journal of General Internal Medicine	To determine if patient race influences physician prescribing.	Controlled experiment: A web based survey with randomized patient race	716 primary care physicians.	Physicians randomized to black and white patients prescribed at comparable rates for hypertension, hyperlipidemia, and diabetes. Patient race influenced drug class select for hypertensive patients; race did not influence prescribing for hyperlipidemia or diabetes. Physicians predicted lower medication adherence rates in AA patients for hypertension and diabetes.

TABLE 2 – *Continued*

Year	Authors Title Journal	Purpose	Design	Sample	Results
2007	Lehrmann, Tanabe, Baumann, Jones, Martinovich, Adams Knowledge Translation of the American College of Emergency Physicians Clinical Policy on Hypertension Academic Emergency Medicine	To determine if clinical policy regarding hypertension to emergency physicians would lead to improvements in BP reassessment and referral of emergency department patients with elevated BP.	A pre-post intervention design with independent samples at pre and post phases	779 charts.	272 (35%) patients received repeat BP measurements and 186 (68%) of those patients continued to have elevated BP. Older patients, white patients, patients with a history of hypertension, and patients with elevated systolic or diastolic BP were more likely to have repeat BP measurements performed. Younger patients, AA patients, male patients, and patients with lower triage BPs were less likely to have reassessment BP measurements conducted.

Adopted from Moran, K. J. (2014). Developing the scholarly project. In K. J. Moran, R. Burson, & D. Conrad (Eds.), *The doctor of nursing practice scholarly project: A framework for success* (1st ed., pp. 118). Burlington: Jones & Bartlett Learning.

Significance of Project

This project evaluated if healthcare providers were selecting JNC 8 guideline recommended pharmacological interventions for hypertensive AA adult clients in a sample population. Identifying deficits in AA adult HTN management can prompt the development of

interventions to correct pharmacological prescribing. Recognizing nonadherence to CPGs among prescribers to address, treat, and manage hypertensive AA adults to control their HTN will help hypertensive AA adults avoid complications from poor BP control.

Purpose and Aims of the Project

The purpose of this DNP project was to improve the care, management, and outcomes of hypertensive AA adults by identifying current JNC 8 guideline prescribing patterns among a sample of hospitalized patients. The first aim of this project was to determine provider-prescribing rates of TDs and CCBs in newly diagnosed AA adults with HTN. The second aim of this project was to determine if AA adults previously diagnosed with HTN were currently prescribed TD and/or CCB medications.

Significance for Advance Practice Nursing

Advance practice nurses (APNs) serve as an integral part of interdisciplinary healthcare teams by treating and managing patient care. Additionally, there are APNs that specialize in hospital medicine or cardiology and routinely provide care specifically for hypertensive AA adults. Results from this project will identify prescribing patterns regarding the inpatient management of AA adults with HTN and if subsequent adjustments to HTN management need to be made. Findings from this project can be applied into practice with more appropriate pharmacological interventions for hypertensive AA adults, following suitable and relevant patient education for drug therapy. Moreover, APNs can educate other members of the interdisciplinary healthcare team regarding proper pharmacological management in AA adults with HTN. Implementing evidence based practice, via adherence to current CPGs, supports best practice with the goal of optimal patient outcomes.

CHAPTER TWO: HYPERTENSION BACKGROUND AND JNC 8 GUIDELINE RECOMMENDATION REVIEW

Pathophysiology of Hypertension

Several underlying mechanisms are responsible for the development of hypertension (HTN). These include organs, hormones, and vascular abnormalities (Cain & Khalil, 2002; Singh, Mensah, & Bakris, 2010; Sudano, Roas, & Noll, 2011). The organs primarily responsible for blood pressure (BP) regulation are the heart and kidneys. Pertaining to the heart, a chronically elevated cardiac output and/or total peripheral resistance are precursors for HTN (Singh, Mensah, & Bakris, 2010). The renal system manages fluid volume and electrolytes within the body, therefore deficiencies may result in sodium and water retention. This retention activates the renin-angiotensin-aldosterone system (RAAS), causes systemic vasoconstriction, increased cardiac output, and ultimately elevates BP (Cain & Khalil, 2002). The autonomic nervous system also has a role in HTN. Baroreceptors and chemoreceptors respond to acute fluctuations in BP by vasoconstriction or vasodilation; however, these compensatory mechanisms are not effective in chronically elevated BP (Singh, Mensah, & Bakris, 2010).

Antidiuretic hormone (ADH) and RAAS work within the renal system impacting cardiac output, total peripheral resistance, and ultimately increasing BP. ADH is released if an acute decrease in BP occurs; however, an increase in BP prohibits the release of ADH. This hormone retains water and causes vasoconstriction of blood vessels, which increases BP. RASS is initiated when a reduction in sodium or BP is detected. RAAS causes sodium retention, increased fluid volume, secretion of potassium, and constriction within the renal arterioles, all of which result in increased BP and HTN (Singh, Mensah, & Bakris, 2010).

Vascular damage and dysfunction also contribute to developing HTN. The vascular endothelial lining protects vessels from atherosclerosis and thrombosis with relaxing factors such as nitric oxide. Without this protective endothelium lining oxidative stress and vasoconstriction can develop (Sudano, Roas, & Noll, 2011). Changes in the endothelium result in vascular remodeling, ultimately decreasing vessel diameter and contributing to increased BP. Endothelium dysfunction is present in nearly all cases of HTN (Cain & Khalil, 2002).

Causes and Categories of Hypertension

Primary, or essential, HTN is caused by genetic and environmental factors (Butler, 2010; CDC, 2014b; Singh, Mensah, & Bakris, 2010; Singh, Singh, Pandey, Chandra, Singh, & Gambhir, 2016). Genetics contribute to approximately 70% of individuals with HTN and even plays a role in the severity of HTN (Butler, 2010; Singh, Mensah, & Bakris, 2010). Due to the multiple medications utilized in the management of HTN, it is improbable that one gene is responsible in contracting HTN (Harrison, Maresso, & Broeckel, 2008; Singh, Mensah, & Bakris, 2010). The angiotensinogen gene, which was the first gene discovered in the linkage of genetics and HTN, is located on chromosome 1. Multiple angiotensinogen polymorphisms exist on this chromosome and are more prominent in individuals with severe cases of HTN (Dickson & Sigmund, 2006). Regions on chromosomes 2 through 5, 7, 11, 12, 15, 17, 18, and 20 have all been linked with contracting essential HTN. Additionally, there are 13 genetic variants that impact systolic BP and 20 genetic variants that effect diastolic BP (Butler, 2010). As a result, essential HTN is considered a polygenic disorder due to its connection with genetics (Singh et al., 2016).

Secondary HTN occurs due to a disease process, such as primary aldosteronism (Flack et al., 2010). Appropriate management would include treating the underlying condition causing the HTN; current clinical practice guideline (CPG) recommendations are not applicable in secondary HTN and will not be addressed in this project (Flack et al., 2010; James et al., 2014).

Environmental factors contribute to approximately 20% to 30% of HTN cases. Environmental factors include individual lifestyle choices, such as diet, alcohol intake, smoking status, and exercise (Singh, Mensah, & Bakris, 2010). According to the AHA (2016a), unhealthy diets, especially those high in sodium, heavy alcohol use, tobacco use, and lack of physical activity, being overweight or obese all correlate with the development of HTN. Furthermore, socioeconomic status, stress, and physical geography play important roles in contracting HTN (Singh, Mensah, & Bakris, 2010).

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) identifies BP classifications in adults. These evidence-based parameters define what is considered normal, prehypertension, stage one HTN, and stage two HTN (Chobanian et al., 2004). Additionally, these BP parameters serve in the establishment of a patient baseline when applying The Eighth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8) guideline recommendations. When evaluating the success of implementing JNC 8 guideline recommendations and appropriate management of HTN, providers often reference JNC 7 parameters. JNC 8 also establishes BP goals based on an individual's age and comorbidities (James et al., 2014).

JNC 7 has identified the following BP classifications for adults: Normal less than 120 mmHg systolic BP and less than 80 mmHg diastolic BP; Prehypertension 120 to 139 mmHg systolic BP or 80 to 89 mmHg diastolic BP; Stage 1 HTN 140 to 159 mmHg systolic BP or 90 to 99 mmHg diastolic BP; Stage 2 HTN 160 or greater mmHg systolic BP or 100 or greater mmHg diastolic BP (Chobanian et al., 2004). The AHA has also developed categories regarding BP in adults. These categories are similar to the JNC 7 categories, with an additional category. If the systolic BP is greater than 180 mmHg or the diastolic BP is greater than 110 mmHg, the AHA identifies this as hypertensive crisis, which requires emergency treatment (AHA, 2016b).

Prevalence of Hypertension

HTN is the most common diagnosis in American adults (James et al., 2014; Weber et al., 2014); approximately 33% of adults, or 77.9 million people, have HTN in the United States (CDC, 2016; Go et al., 2013). HTN demonstrates an increased prevalence as individuals age; adults age 20 to 34 account for 8.95% of hypertensive cases, while individuals 75 years of age and older account for 72.6% of hypertensive cases (CDC, 2016). In 2015 the World Health Organization (2016) estimated American females age 18 and older had an average systolic BP of 117.3 mmHg, with a range of 113.6 mmHg to 121.0 mmHg. American males age 18 and older had a mean systolic BP of 123.6 mmHg, with a range of 120.0 mmHg to 127.2 mmHg. This data is troubling considering the prehypertension category of 120 to 139 mmHg established and recognized by the JNC 7 and AHA (Chobanian et al., 2004; AHA, 2016b). The CDC (2016) currently estimates another one-third of the American adult population can be classified as prehypertensive.

Special Population: African American Adults

HTN affects African American (AA) adults at alarmingly disproportionate rates compared to the general population. Within the general population 34.1% of adult males and 32.7% of adult females have HTN; within the AA adult population 43.0% of males and 45.7% of females have HTN (CDC, 2016). HTN in AAs is typically more severe and occurs at an earlier age compared to Caucasians. This correlates with the "a 1.8-times greater rate of fatal stroke … and a 4.2-times greater rate of end-stage kidney disease" in AAs versus Caucasians (Go et al., 2013). In 2013, the death rate for HTN, in the general population, was 19.9 per 1,000 individuals; this equated to 477,483 with HTN related to mortality rates. AA adult males had a HTN death rate of 51.6 and AA adult females had a HTN death rate of 36.5 (Mozaffarian et al., 2016).

Adverse Effects of Hypertension

HTN is often asymptomatic and is known as the 'silent killer' (AHA, 2016b). However, target organ damage is the greatest consequence in individuals with HTN (Singh, Mensah, & Bakris, 2010). Negative pathophysiology conditions develop with HTN, thereby increasing mortality and morbidities rates. Many diseases and comorbidities are precursors of uncontrolled HTN. The most common conditions associated with HTN include, but are not limited to, cardiovascular events and chronic kidney disease/end stage renal disease (CDC, 2014b; Mozaffarian et al., 2016). Adults 50 years of age that are normotensive compared to those with HTN typically have a five year longer life expectancy (Roger et al., 2012). The JNC 8 states HTN "leads to myocardial infarction, stroke, renal failure, and death if not detected early and treated appropriately" (James et al., 2014).

The CDC (2014a) identifies HTN as a major risk responsible for CVAs. Approximately 77% of individuals that have their fist CVA have HTN (Roger et al., 2012). High BP causes damage to the vascular endothelium, which results in arterial weakness over time. This damage typically generates an ischemic stroke, but can also cause a hemorrhagic stroke (Singh, Mensah, & Bakris, 2010; World Heart Federation, 2017). Individuals that suffer from CVAs may also experience increased intracranial pressure. According to Biffi and colleagues (2015), patients that suffer strokes resulting in intracranial hemorrhage are more likely to experience subsequent CVAs and increased intracranial pressure if BPs continue to be uncontrolled. Additionally, in a study conducted by Zahuranec et al (2012) individuals with recurrent intracranial hemorrhages typically continue to have inadequate BP control one year post bleed; less than 20% of participants obtained a BP less than 120/80 mmHg. AA men and women have the highest CVA prevalence compared to any ethnic group; black men 4.2% and black women 4.7% compared to the national adult average of 2.6% (Mozaffaria et al., 2016).

Two frequent cardiac conditions that can occur from HTN are MIs and HF (CDC, 2014a). Nearly 69% of individuals that have their first MI and 74% of individuals with HF have HTN (Roger et al., 2012). An elevated BP causes mechanical stress and eventually endothelium damage to blood vessels. This process promotes the formation of atherosclerosis, plaque rupture, and subsequently potential MIs (Rakugi et al., 1996). AA men and women have a MI rate of 4.3% and 2.2% respectively; Caucasian men and women have a rate of 4.3% and 2.1% (Roger et al., 2012). The mechanical stress of HTN can also cause ventricular hypertrophy and/or dysfunction, eventually leading to HF (Papademtriou, 2004). MIs have a 15% mortality rate, and 34% of individuals that have a MI die within one year (Roger et al., 2012). Approximately 50%

of individuals diagnosed with HF will die within five years (Mozaffarian et al., 2016). The rate of HF in AA adults is 9.1 per 1,000 person years compared to 6 per 1,000 person years in Caucasian adults (Go et al., 2013).

Chronic kidney disease (CKD) and subsequent end stage renal disease (ESRD) can both result from uncontrolled HTN (Mozaffarian et al., 2016); HTN is the second leading cause of CKD (National Institute of Diabetes and Digestive and Kidney Diseases, 2014). Individuals with CKD also have an increased risk for experiencing recurrent cardiovascular events (Mozaffarian et al., 2016). HTN causes vessel dysfunction and damage within the renal system. The kidneys' vasculature attempt to compensate by stretching, however this causes the vessel walls to weaken, scar, and develop further nephrovascular damage (National Institute of Diabetes and Digestive and Kidney Diseases, 2014). Over time, this destruction causes a decrease glomerular filtration rate and excessive protein excretion. The progression of CKD, which is ranked from stage 1 to 5, ends with ESRD in which dialysis is required (Mozaffarian et al., 2016). Dialysis patients have a predisposition for HTN due to extracellular volume expansion that occurs; 86% of hemodialysis patients are hypertensive (Malliara, 2007). One-third of adults with ESRD are AA adults and are typically diagnosed 10 years earlier than Caucasian adults (Mozaffarian et al., 2016).

Poor HTN control results in mounting healthcare costs. It is estimated that the indirect and direct cost of HTN is $48.6 billion. By 2030, it is projected HTN will cost $274 billion (Mozaffarian et al., 2016). According to Will and Yoon (2013), from 1995 to 2010 there were approximately 4,758,728 American adult preventable hospitalizations from HTN. When comparing AA hospitalizations related to HTN versus Caucasian hospitalizations related to HTN

from 2007 to 2010, blacks had a rate of 334.2 per 100,000 population, while whites had a rate of 97.4 per 100,000 population (Will & Yoon, 2013).

Management of Hypertension

Treatment Issues

Socioeconomic status. Individuals of a lower socioeconomic status have challenges appropriately managing chronic conditions, including HTN (Leng et al., 2015; Lam, 2011). Specific socioeconomic elements that affect HTN include behavioral and psychosocial factors such as diet, exercise, stress, depression, isolation, living environment, and coping skills (Lam, 2011). Leng and colleagues (2015) identified income, occupation, and education level have the greatest impact for HTN in those of a lower socioeconomic status. According to Brummett et al (2011), income is the most influential factor linking increased systolic blood pressure with lower socioeconomic statuses; for each $50,000 increase per year in income a decrease of 0.61 mmHg of systolic pressure was discovered, which is statistically significant.

Comorbidities. The presence of multiple comorbid conditions presents unique management challenges. Individuals with more than one disease process have increased inpatient and outpatient costs, as well as pharmacy costs (Eaddy et al., 2008). This dilemma may cause patients to manage one condition over another; conversely, not treating one disease process may exacerbate another. Fix and colleagues (2014) discovered patients with HTN and multiple comorbidities experience polypharmacy, which leads to confusion regarding the purpose of prescribed medications. This also contributed to patients self-managing all of their conditions. Due to HTN presenting asymptomatically, many patients chose to manage other disease processes rather than their HTN (Fix et al., 2014).

Patient awareness. Patient recognition and understanding of their BP plays a pivotal role is HTN management. Individuals that are unaware of the importance of HTN and BP typically have poor health outcomes. While 90% of hypertensive adults correlate lower BPs with improved overall health, more than half (53.5%) do not have their condition under control. Moreover 39.4% of hypertensive adults are not aware of having high BP; 15.8% are aware of their HTN but not receiving pharmacological therapy (CDC, 2012). Similarly, in a study conducted by Oliveria and colleagues (2005) 91% of hypertensive participants identified sustaining a lower BP is health beneficial and 41% of participants were unaware of their own BP level. Additionally, just 30% of participants could correctly identify both systolic BP and diastolic BP. Only 13% of participants identified the systolic BP as "more important in the control and prevention of disease" compared to the diastolic BP; 17% did not know if the systolic or diastolic BP was important (Oliveria et al., 2005). According to Alexander et al (2003), hypertensive AA adults, compared to other ethnic/racial groups, are less aware of their elevated systolic BP and are less likely to appropriately identify their BP as 'too high.' Participants also had poor association of HF and renal disease linked to HTN (Alexander et al., 2003).

Health literacy and provider communication. Patient health literacy correlates with HTN knowledge and personal practices. In a study conducted by Alexander and colleagues (2003), 76.1% of participants correctly identified HTN as high BP, but 12.5% of participants defined HTN as 'high level of stress.' Weekes (2012) conducted a systematic review on health literacy in AA adults that revealed common themes of decreased comprehension of the disease process, which lead to decreased adherence to treatment. Other factors that can affect health

literacy include educational level, primary language, and the method selected for patient education (Weekes, 2012). In a recent study conducted with AA hypertensive patients, participants reported physicians not explaining the consequences of HTN in language that could be understood. Participants also reported physicians not discussing their concerns during a visit and simply writing a prescription with no elaboration of the treatment. Conversely, when these patients attended a cardiovascular clinic, they stated the nurse provided "helpful health information…to help lower their BP" (Rimando, 2015). Overall, current methods of physician communication do not effectively aid in managing chronic patient conditions in AA adults, particularly in those with low health literacy (Weekes, 2012). A multidisciplinary approach has also proven more effective, particularly when treating HTN. One study demonstrated increased BP control from 51.0% to 67.4% after implementation of multidisciplinary care with a registered nurse, pharmacist, and physician. Medication adherence scores also improved from 56.9% to 69.7%, but decreased at the cessation of the study. The multidisciplinary approach places the patient at the center of communication with multiple sources of knowledge, thereby reinforcing and reiterating important aspects of care, resulting in improved patient outcomes (Fortuna et al., 2015).

Patient adherence. Despite several pharmacological options available to properly manage HTN, patient adherence continues to be an issue (Peacock & Krousel-Wood, 2017). Patients that have cardiovascular conditions and risk factors for cardiovascular disease have a prescribed medication adherence rate of roughly 50% (Kronish & Ye, 2013). Drug adherence also varies per drug class. Adherence rates are the lowest for beta-blockers (28%) and the highest for ARBs (65%) (Kronish et al., 2011). Individuals with the greatest risk of nonadherence of

hypertensive medications have a low annual income, are younger than 75 years old, not married, and are minorities (Krousel-Wood et al., 2009; Morisky, Ang, Krousel-Wood, & Ward, 2008). Patient attributes that contribute to cardiovascular drug nonadherence include disease and medication beliefs, self-efficacy, psychological disorders, memory and cognition, and social support (Kronish & Ye, 2013).

Clinical inertia. Despite the implementation of evidence based research and practice, providers continue to struggle with adherence to CPGs (Lavoie, Rash, & Campbell, 2017; Sessoms et al., 2015). Clinical inertia was first defined by Phillips and colleagues (2001) as "recognition of [a] problem, but failure to act." HTN was identified as a condition where inappropriate management occurs due to the asymptomatic presentation. Consequently "health care providers often do not initiate or intensify therapy appropriately;" this ultimately results in subpar or no management and unfavorable patient outcomes. Phillips et al (2001) originally recognized three causes of clinical inertia: overestimation of care provided, reasons to avoid intensifying therapy, and lack of training in a practice organization focused on goals. Additional factors have been identified by Lavoie et al (2017) and are depicted in Figure 1.

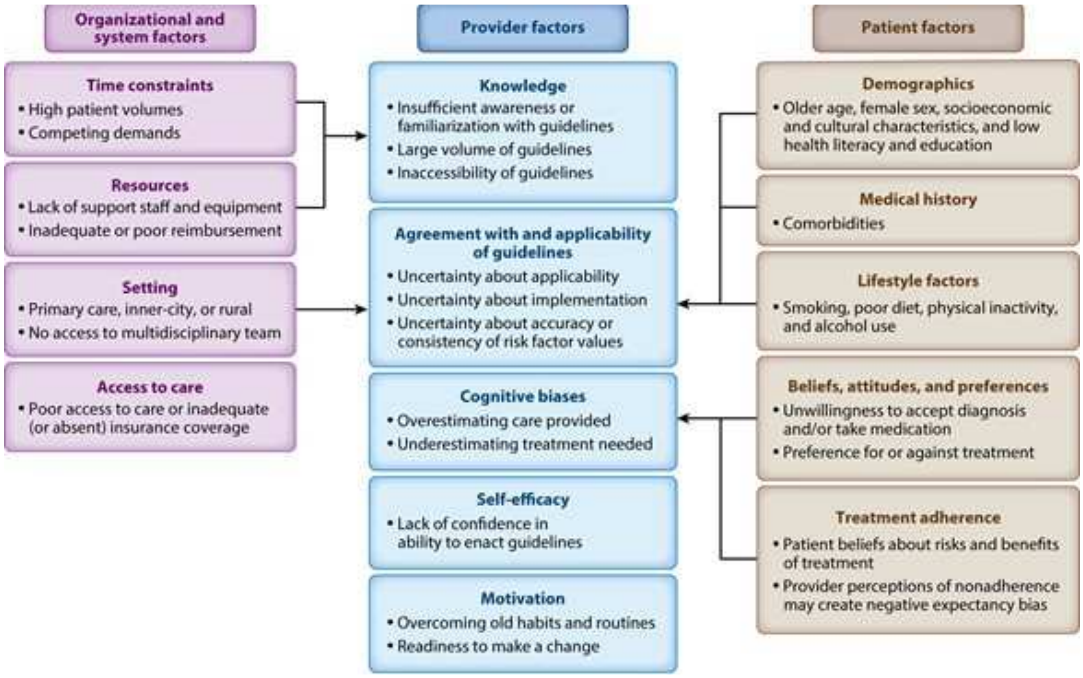

FIGURE 1. Organizational and System, Provider, and Patient Factors Associated with Clinical Inertia. (Adapted from Lavoie et al., 2017).

Clinical inertia continues to be an issue in proper treatment of HTN. A recent study conducted in the primary care setting revealed provider adherence to CPGs for hypertensive AA adults was nonexistent. No providers obtained laboratory data or initiated pharmacological therapy with a thiazide diuretic (TD) or calcium channel blocker (CCB) and most prescribers initiated pharmacological interventions with angiotensin converting enzyme inhibitors/angiotensin receptor blockers (ACEIs/ARBs). Nonpharmacological interventions, such as implementing the dietary approaches to stop hypertension (DASH) diet and limiting alcohol intake, were only documented in 6.5% of participants. Additionally 33.2% of participants required medication adjustments per the JNC 7 recommendations, but only 15.2% received adjustments (Sessoms et al., 2015). Similar results were discovered in a study conducted by Mu and Mukamal (2016); only 11% of patients received medication adjustments in the over 88

million visits for HTN to ambulatory care in the United States from 2005 to 2012. This equated to only one in six patients receiving necessary HTN medication adjustments (Mu & Mukamal, 2016).

JNC 8 Guideline Purpose

JNC 8 Guidelines serve as an update from the JNC 7 Guidelines, which were originally published in 2004 (Chobanian et al., 2004). JNC 8 Guidelines were derived by way of systematic reviews from randomized controlled trials that were conducted by an expert panel and methodology team. The panel developed ten recommendations, which were given grades for strength of recommendation. The purpose of the JNC 8 Guidelines is to serve as an "intersection between research evidence and clinical actions that can improve patient outcomes" (James et al., 2014). See Table 3 and 4 for all recommendations with grades and grading scale.

TABLE 3. *JNC 8 Recommendations and Grades*

Recommendation 1	In the general population aged greater than or equal to 60 years, initiate pharmacologic treatment to lower BP at systolic BP (SBP) greater than or equal to 150 mmHg or diastolic BP (DBP) greater than or equal to 90 mmHg and treat to a goal SBP of less than 150 mmHg and goal DBP of less than 90 mmHg. *Strong Recommendation – Grade A*
Corollary Recommendation	In the general population aged greater than or equal to 60 years, if pharmacologic treatment for high BP results in lower achieved SBP (less than 140 mmHg) 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 less than 60 years, initiate pharmacologic treatment to lower BP at DBP greater than or equal to 90 mmHg and treat to a goal DBP less than 90 mmHg. For ages 30-59 years, *Strong Recommendation – Grade A* For ages 18-29 years, *Expert Opinion – Grade E*
Recommendation 3	In the general population less than 60 years, initiate pharmacologic treatment to lower BP at SBP greater than or equal to 140 mmHg and treat to a goal SBP less than 140 mmHg. *Expert Opinion – Grade E*

TABLE 3 – *Continued*

Recommendation 4	In the population aged greater than or equal to 18 years with CKD, initiate pharmacologic treatment to lower BP at SBP greater than or equal to 140 mmHg or DBP greater than or equal to 90 mmHg and treat to goal SBP of less than 140 mmHg and goal DBP of less than 90 mmHg. *Expert Opinion – Grade E*
Recommendation 5	In the population aged greater than or equal to 18 years with diabetes, initiate pharmacologic treatment to lower BP at SBP greater than or equal to 140 mmHg or DBP greater than or equal to 90 mmHg and treat to goal SBP of less than 140 mmHg and goal DBP of less than 90 mmHg. *Expert Opinion – Grade E*
Recommendation 6	In the general nonblack population, including those with diabetes, initial antihypertensive treatment should include a TD, CCB, ACE I, or ARB. *Moderate Recommendation – Grade B*
Recommendation 7	In the general black population, including those with diabetes, initial antihypertensive treatment should include a TD 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 greater than or equal to 18 years with CKD, initial (or add-on) antihypertensive treatment should include an ACE I or ARB to improve kidney outcomes. This applies to all CKD patients with HTN regardless of race or diabetes status. *Moderate Recommendation – Grade B*
Recommendation 9	The main objective of HTN 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 (TD, CCB, ACE I, 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 sure an ACE I 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 HTN 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*

Adopted from The Eighth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (James et al., 2014).

TABLE 4. *JNC 8 Grading Scale*

Grade	Strength of Recommendation
A	*Strong Recommendation*: There is high certainty based on evidence that the net benefit is substantial.
B	*Moderate Recommendation*: There is moderate certainty based on evidence that the net benefit is moderate to substantial or there is high certainty that the net benefit is moderate.
C	*Weak Recommendation*: There is at least moderate certainty based on evidence that there is a small net benefit.
D	*Recommendation against*: There is at least moderate certainty based on evidence that it has no net benefit or that risks/harms outweigh benefits.
E	*Expert Opinion* ("There is insufficient evidence or evidence is unclear or conflicting, but this is what the committee recommends."): Net benefit is unclear. Balance of benefits and harms cannot be determined because of no evidence, insufficient evidence, unclear evidence, or conflicting evidence, but the committee though it was important to provide clinical guidance and make a recommendation. Further research is recommended in this area.
N	*No Recommendation for or against* ("There is insufficient evidence or evidence is unclear or conflicting."): Net benefit is unclear. Balance of benefits and harms cannot be determined because of no evidence, insufficient evidence, unclear evidence, or conflicting evidence, and the committee though no recommendation should be made. Further research is recommended in this area.

Adopted from The Eighth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (James et al., 2014).

JNC 8 Blood Pressure Goals

JNC 8 Guideline recommendation BP goals in adults are as follows: general population greater than or equal to 60 years of age is less than 150/90 mmHg, general population less than 60 years of age is less than 140/90 mmHg, adults greater than or equal to 18 years of age with diabetes and/or CKD is less than 140/90 mmHg. Although the aforementioned BP values are goals, the JNC 8 panel continues to identify HTN as greater than 140/90 mmHg, which was first defined in the JNC 7 Guideline (James et al., 2014).

JNC 8 Guideline Base Management Strategies for Hypertension

Since the original Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure published in 1977, the JNC has endorsed lifestyle modification as the first line nonpharmacological intervention in HTN management (Moser, 2006). These specific recommendations include a reduction in weight and sodium intake, implementing a regular exercise regiment, moderate alcohol intake, and avoiding tobacco products (DeQuattro, 1990; Moser, 2006). See Table 5 for the latest lifestyle modifications, which were issued by the JNC 7. In the event nonpharmacological interventions are not successful in BP reduction, pharmacological interventions should be made in addition to lifestyle modifications. Drug therapy selection varies based on an individual's pre-existing conditions, age, and racial/ethnic group (James et al., 2014).

TABLE 5. *Lifestyle Modifications to Prevent and Manage Hypertension**

Modification	Recommendation	Approximate SBP Reduction (range)**
Weight reduction	Maintain normal body weight (body mass index 18.5 to 24.9 kg/m^2).	5–20mmHg/10kg
Adopt Dietary Approached to Stop Hypertension (DASH) eating plan	Consume a diet rich in fruits, vegetables, and low fat dairy products with a reduced content of saturated and total fat.	8–14 mmHg
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mmol per day (2.4g sodium or 6g sodium chloride).	2–8 mmHg
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 minutes per day, most days of the week).	4–9 mmHg

TABLE 5 – *Continued*

Modification	Recommendation	Approximate SBP Reduction (range)**
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (e.g., 24oz beer, 10oz wine, or 3oz 80-proof whiskey) per day in most men, and to no more than 1 drink per day in women and lighter weight persons.	2–4mmHg

*For overall cardiovascular risk reduction, stop smoking.
** The effects of these modifications depend on dose and time and could be greater in some individuals.
Adopted from The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. (Chobanian et al., 2004).

Pharmacological Guideline Recommendations for African Americans with Hypertension

Recommendation 7 focuses on AA hypertensive adults, and states the following: "In the general black population, including those with diabetes, initial participants." CCBs were also favored above ACE I due to increased stroke rates (51%) in AA adults; antihypertensive treatment should include a thiazide-type diuretic or CCB. This recommendation was derived from several evidence based research studies that determined the aforementioned drug classes are more effective in the AA population. Specifically, TDs were "shown to be more effective in improving cerebrovascular, heart failure, and combined cardiovascular outcomes compared to an ACE I… [including] diabetic and nondiabetic [black] participants" taking ACE I compared to CCBs; additionally, ACE I did not control AA HTN as effectively as CCB. This data is not applicable to AA with HTN and CKD; therefore, the panel addressed this special population in

Pharmacological Guideline Recommendations for African Americans with Hypertension and Chronic Kidney Disease

In AA adults with CKD the management of HTN correlates with treatment of the general population, regardless of race, with CKD. Recommendation 8 states "[i]n the population aged 18 years or older with CKD and hypertension, initial (or add-on) antihypertensive treatment should include an ACE I or ARB to improve kidney outcomes. This applies to all CKD patients with hypertension regardless of race or diabetes status." This was determined by the expert panel due to CKD progressing to ESRD; as a result, this outcome trumped race/ethnicity, particularly AA with CKD and proteinuria. Conversely, in AAs with CKD and no proteinuria the suggested first line drug therapy may be a TD, CCB, ACE I, or ARB. In the event drug therapy is not effective strategies to appropriately dose antihypertensive drugs should be followed. Because this patient population is typically treated with more than one antihypertensive medication, multiple drugs can be utilized to manage HTN and CKD. However, ACE Is and ARBs are not to be taken by the same patient because they are both direct renin inhibitors.

Strategies to Dose Antihypertensive Medications

The JNC 8 has developed three different strategies to appropriately dose medications in hypertensive patients. Strategy A entails initiation of one medication and adjust to the maximum dose, then adding a second medication if needed. Strategy B initiates one medication and adds a second medication prior to reaching the maximum dose in the initial medication. In Strategy C providers introduce two medications simultaneously as either two separate pills or a combination pill. If Strategies A, B, or C are unsuccessful in achieving HTN control an additional drug class

can be added (i.e. beta blocker, aldosterone antagonist, or others) as well as referral to a hypertensive management specialist (James et al., 2014).

CHAPTER THREE: METHODS

Methods for Specific Aims

Specific Aim 1

The first aim of this project was to determine provider-prescribing rates of thiazide diuretics (TDs) and calcium channel blockers (CCBs) in newly diagnosed African American (AA) adults with hypertension (HTN) in hospitalized patients.

Rationale. First line pharmacological interventions for hypertensive AA adults include prescribing TDs and/or CCB drug classes. By establishing if guideline adherent care was administered, subsequent factors that contribute to the escalating problem of HTN in AA adults can also be identified. Findings from this project can also facilitate the creation of strategies for improved provider compliance of CPGs, ultimately reducing AA adult HTN.

Specific Aim 2

The second aim of this project was to determine if AA adults previously diagnosed with HTN are currently prescribed TD and/or CCB medications in hospitalized patients.

Rationale. Per JNC 8 Guideline Recommendations certain drug classes are not as effective in treating HTN in the AA adult population. Evaluation of antihypertensive medications prescribed in conjunction with blood pressure (BP) control, or lack thereof, will allow an opportunity to introduce appropriate pharmacological interventions. This will also result in better management of AA HTN and better overall patient outcomes.

Project Design

A descriptive quantitative cross-sectional design of AA adult patients meeting the following criteria were selected for this project: a new diagnosis of HTN or a previous diagnosis

of HTN and hospital admission. Participants were discharged from Medical City Dallas between the dates of 01/01/2017 through 03/31/2017.

Setting

The project was conducted at Medical City Dallas, which is a 668 bed, for-profit, short term, acute care hospital located in north Texas. Services provided by this facility include, but are not limited to, cardiology, cardiovascular surgery, medicine, organ transplant, emergency care, intensive care, and telemetry.

Sample

This project consisted of AA adult patients on inpatient, medicine units within Medical City Dallas. Patient medical records were captured for three months. The most remote date was 01/01/2017 and the most recent date was 03/31/2017; approximately 400 eligible participants were identified. The sample was identified with one of the following ICD-10 code diagnoses: I10 (essential [primary] HTN), I12.9 (hypertensive chronic kidney disease with stage 1 through 4 chronic kidney disease), or I12.0 (hypertensive chronic kidney disease with stage 5 chronic kidney disease or end stage renal disease). Exclusion criteria included individuals 17 years of age and younger, not identified as black ethnicity/race, pregnant women, patients on hospice/palliative care, current hemodialysis patients, patients admitted to any intensive care or oncology units, and any patients that expired during their hospital stay.

Data Collection

Instrumentation and Data Management

A data collection tool was created via a Microsoft® Excel spreadsheet (Appendix A). The principal investigator (PI) evaluated the accuracy and completeness of each data entry, as

well as all medications each participant was previously or newly prescribed for HTN. These medications were compared to JNC 8 pharmacological guideline recommendations. Participants without chronic kidney disease (CKD) that were started on a TD or CCB by discharge or participants with CKD that were started on an angiotensin converting enzyme inhibitor (ACE I) or angiotensin receptor blocker (ARB) by discharge have met JNC 8 Guideline Recommendations. Additionally, graphs were developed to identify data trends and correlations.

Abigail Mindle, the Senior Financial Reporting Analyst at Medical City Dallas, stored project data in a password protected file to which she and the PI had access to which was stored on the Medical City Dallas server. Confidentiality of participants was protected by assigning each subject a study identification number, which was determined by numerical order of visit date.

Analysis

Descriptive statistics were utilized to compare data obtained for this project. This included participants' ICD-10 diagnosis codes, newly or previously diagnosed with HTN, age, gender, race/ethnicity, allergies, HTN medications upon admission, HTN medications upon discharge, provider type (i.e., MD, DO, NP, PA), and provider specialty (i.e., hospitalist, internal medicine, cardiology). Additionally, diabetes mellitus type 1 and 2 (ICD-10 codes E10 and E11) rates and chronic kidney disease of all stages (ICD-10 codes N18.1, N18.2, N18.3, N18.4, N18.5, N18.6, and N18.9) were assessed due to the role and impact these diseases play in conjunction with HTN management (See Figure 2 below for the complete 2014 Hypertension Guideline Management Algorithm).

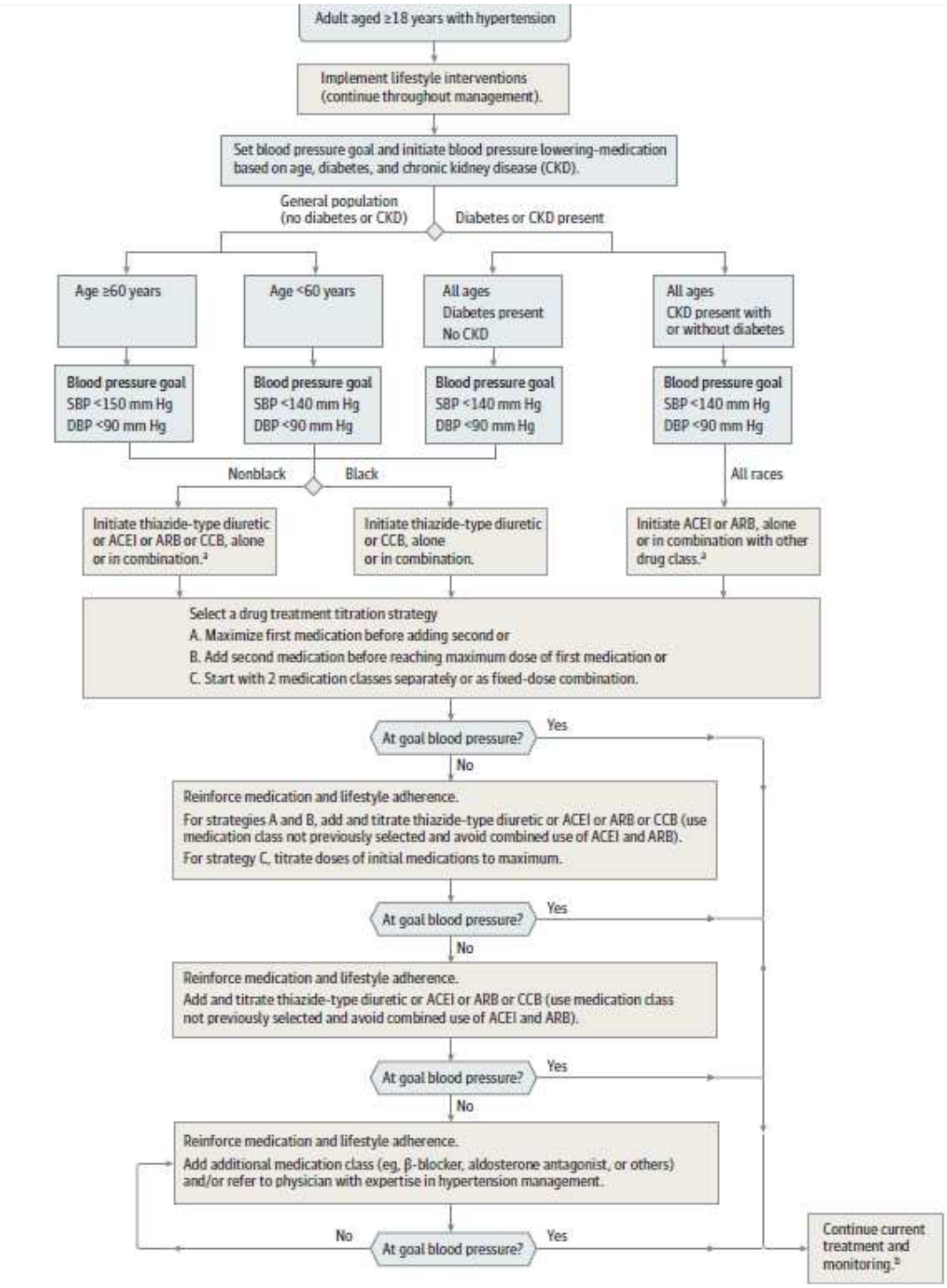

FIGURE 2. Hypertension Guideline Management Algorithm. (Adapted from James et al., 2014).

Project Risks and Benefits

The only risk to participants in this project was the potential disclosure of private healthcare information. To protect patient healthcare information the PI and Mrs. Mindle were the only individuals granted access to patient records. Private healthcare information was also protect via password entry to retrieve data. In addition, the PI and Mrs. Mindle completed Collaborative Institutional Training Initiative (CITI) courses regarding human subjects and confidentiality prior to any data collection. Since all participants received treatment prior to this project, patient care was not impacted or compromised. Conversely, participants will not receive any benefits by participating in this project unless future treatment for HTN is received. These benefits are the same for all patients, whether they were participants or not, seeking care after the completion of this Doctor of Nursing (DNP) project: improvement of HTN management via appropriate pharmacological interventions per JNC 8 Guideline Recommendations. Furthermore, Medical City Dallas will benefit from the identification of inappropriate treatment of hypertensive adults, thereby developing and implementing interventions that ultimately lead to effective care and improved patient outcomes. In August of 2018 Medical City North Texas Division will have a research day in which these findings will be presented to Medical City Dallas and the North Texas Division.

CHAPTER FOUR: RESULTS

Evaluation of Original Sample

Abigail Mindle, Senior Financial Analyst at Medical City Dallas and key personnel on this Doctor of Nursing Practice (DNP) project, identified all African American (AA) adults that met inclusion criteria. Eligibility for inclusion was determined by a discharge date between January 1, 2017 and March 31, 2017, ICD-10 code I10 (primary [essential] hypertension), I12.9 (hypertensive chronic kidney disease with stage 1 through 4 chronic kidney disease), or I12.0 (hypertensive chronic kidney disease with stage 5 chronic kidney disease or end stage renal disease). Other variables collected included age, gender, provider specialty ordering certain drug classes (i.e., thiazide diuretics, calcium channel blockers, angiotensin converting enzyme inhibitors, angiotensin receptor blockers, beta blockers, and other antihypertensive medications) during the patient's admission, the presence and type of diabetes mellitus (DM), and the presence of chronic kidney disease (CKD). This resulted in an original sample size of 417 participants. Mrs. Mindle was able to obtain partial results of participants newly diagnosed with essential [primary] hypertension (HTN) and previously diagnosed with HTN; she was unable to retrieve subjects' drug allergies, HTN medications on admission, and HTN medications on discharge.

Once the PI was given the sample of 417, the missing data points of newly diagnosed with HTN and previously diagnosed with HTN on some participants and drug allergies were retrieved via manually viewing each patient's chart and extracting the appropriate data. Upon manual examination of each participant's chart, the PI noticed some individuals included in the sample had exclusion criteria, such as on hemodialysis, an oncology patient, or were an intensive

care unit (ICU) patient. Therefore, the PI eliminated these individuals from the sample. This resulted in a final sample size of 231 subjects.

Sample Characteristics

Medical records from the eligible 231 HTN patients meeting all inclusion criteria were reviewed. The average patient age was 58.52 ± 14.76 years, with a range from 22 to 93 years of age. 64.07% of participants were female, 79.65% of participants had HTN, and 97.84% of participants were previously diagnosed with HTN. The two main JNC 8 HTN comorbidities of the sample included 22.51% with CKD present and 60.61% with no DM present (See Table 6 for full sample characteristic data).

TABLE 6. *Sample Characteristic Data*

	Raw Number	Percentage
Average age in years with standard deviation	58.52 ± 14.76	Not applicable
Range of ages in years	22 - 93	Not applicable
Males	83	35.93%
Females	148	64.07%
Primary [Essential] HTN - I10 Diagnosis Code	184	79.65%
Hypertensive CKD with stage 1 through 4 CKD - I12.9 Diagnosis Code	44	19.05%
Hypertensive CKD with stage 5 CKD or End Stage Renal Disease - I12.0 Diagnosis Code	3	1.3%
Newly Diagnosed with HTN	5	2.16%
Previously Diagnosed with HTN	226	97.84%
Type I DM Present - E10 Diagnosis Code	1	0.43%
Type II DM Present - E11 Diagnosis Code	90	38.96%
No DM Present	140	60.61%
CKD Present (I12.9 or I12.0 Diagnosis Code)	52	22.51%
No CKD Present	179	77.49%

Sample Allergies

Nearly half of participants (48.92%) had a drug allergy listed in their medical records. Of those with drug allergies, 17 participants (15.04%) had allergies to medications that would be

used in the management of HTN. The most common drug allergy was angiotensin converting enzyme inhibitors (ACE Is) and Lisinopril, which attributed to 12.39% of the sample that had drug allergies. Compared to the overall sample of 231 participants, relevant HTN drug allergies were identified in 7.36% of patients (See Table 7 for full sample allergy data).

TABLE 7. *Sample Allergies Data*

	Raw Number	Percentage of Drug Allergy Participants Only (113)	Percentage of Entire Sample Size (231)
Drug Allergies Present	113	100%	48.92%
HTN Drug Allergies	17	15.04%	7.36%
Allergy to ACE I	6	5.31%	2.6%
Allergy to Lisinopril	8	7.08%	3.46%
Allergy to Nifedipine	1	0.88%	0.43%
Allergy to Amlodipine	1	0.88%	0.43%
Allergy to Olmesartan	1	0.88%	0.43%
No Drug Allergies Present	118	0%	51.08%

Admission and Discharge Medication Classes of Sample

Upon admission, 32 participants (14.85%) were not prescribed any HTN medications. The most popular home HTN drug class participants presented on were BBs (42.42%), while the least popular were thiazide diuretics (TDs) (19.48%). Other HTN drug classes outside of the JNC 8 recommendations accounted for 31.17% of medications on admission; these drug classes included diuretics, vasodilators, and alpha-agonists (See Table 8 for full admission medication classes).

No HTN medications were prescribed to 14.72% of participants upon hospital discharge; this included one newly diagnosed participant with HTN. Similar to admission medications, BBs were the most prominent medications participants were discharged on (48.05%) and TDs were the least to be prescribed on discharge (15.15%). Other HTN drug classes outside of the JNC 8

recommendations accounted for 32.9% of medication upon discharge (See Table 8 for full admission medication classes).

TABLE 8. *Admission and Discharge Medication Class Data*

	HTN Admission Medications	HTN Discharge Medications	Percent Change
No HTN Medications	14.85%	14.72%	-0.88%
TDs	19.48%	15.15%	-22.23%
CCBs	30.3%	34.63%	+14.29%
ACE Is	28.57%	22.94%	-19.71%
BB	42.42%	48.05%	+13.27%
***Other HTN Medications**	31.17%	32.9%	+5.55%

*Other HTN medications include furosemide, hydralazine, clonidine, and spironolactone.

Medication Classes Prescribed by Provider Type

The main provider types evaluated for HTN medications ordered during the duration of participants' length of stay included medical doctors (MDs), doctors of osteopathic medicine (DOs), nurse practitioners (NPs), and physician assistants (PAs). Dentists and doctors of podiatry medicine (DPM) were labeled as *other* providers; additionally, any provider that did not have credentials listed but prescribed HTN medications were also placed in the category of *other*. Due to missing provider data and credentials, it was not possible to categorize provider types (i.e., MDs, DOs, NPs, & PAs) into specialty types (internal medicine, hospital medicine, cardiology, renal, endocrine, and other). In total, 143 MDs, 12 DOs, 11 NPs, 28 PAs, and 17 *other* providers prescribed medications to the participants in this project. Overall all providers ordered BBs more than any other drug class (143 occurrences), followed by other HTN medications (123 occurrences; i.e., furosemide, hydralazine, clonidine, and spironolactone). See Table 9 for all providers' medications order by drug class during participants' hospital stay.

A total of 517 HTN medications were ordered during the participants' hospital stay. MDs ordered medications the most; 354 occurrences or 68.47%. NPs ordered the least number of HTN medications at 22 occurrences, or 4.26%. MDs and DOs ordered calcium channel blockers (CCBs) with the most frequency than any other provider type at 23.73% and 22.22%, respectively. All provider types rarely ordered TDs; PAs had the highest frequency of TDs with 11.43% frequency and no NPs prescribed this drug class. Moreover, NPs and PAs both had increased prescribing rates in ACE Is and other HTN medications. NPs had a tied frequency rate of ACE Is and other HTN medications at 31.82%, or seven occurrences. PAs had a top ordering rate of other HTN medications at 31.43%, or 11 occurrences, and a ACE I rate of 22.85%, or eight occurrences. See Figure 3 for complete results.

TABLE 9. *All Medication Classes Ordered by Providers*

Medication Class	**Raw Number**	**Percentage**
Thiazide Diuretics (TDs)	33	6.38%
Calcium Channel Blockers (CCBs)	116	22.44%
Angiotensin Converting Enzyme Inhibitors (ACE Is)	53	10.25%
Angiotensin Receptor Blockers (ARBs)	49	9.48%
Beta Blockers (BBs)	143	27.66%
Other HTN Medications (i.e. furosemide, hydralazine, clonidine, and spironolactone)	123	23.79%
TOTAL	*517*	*100%*

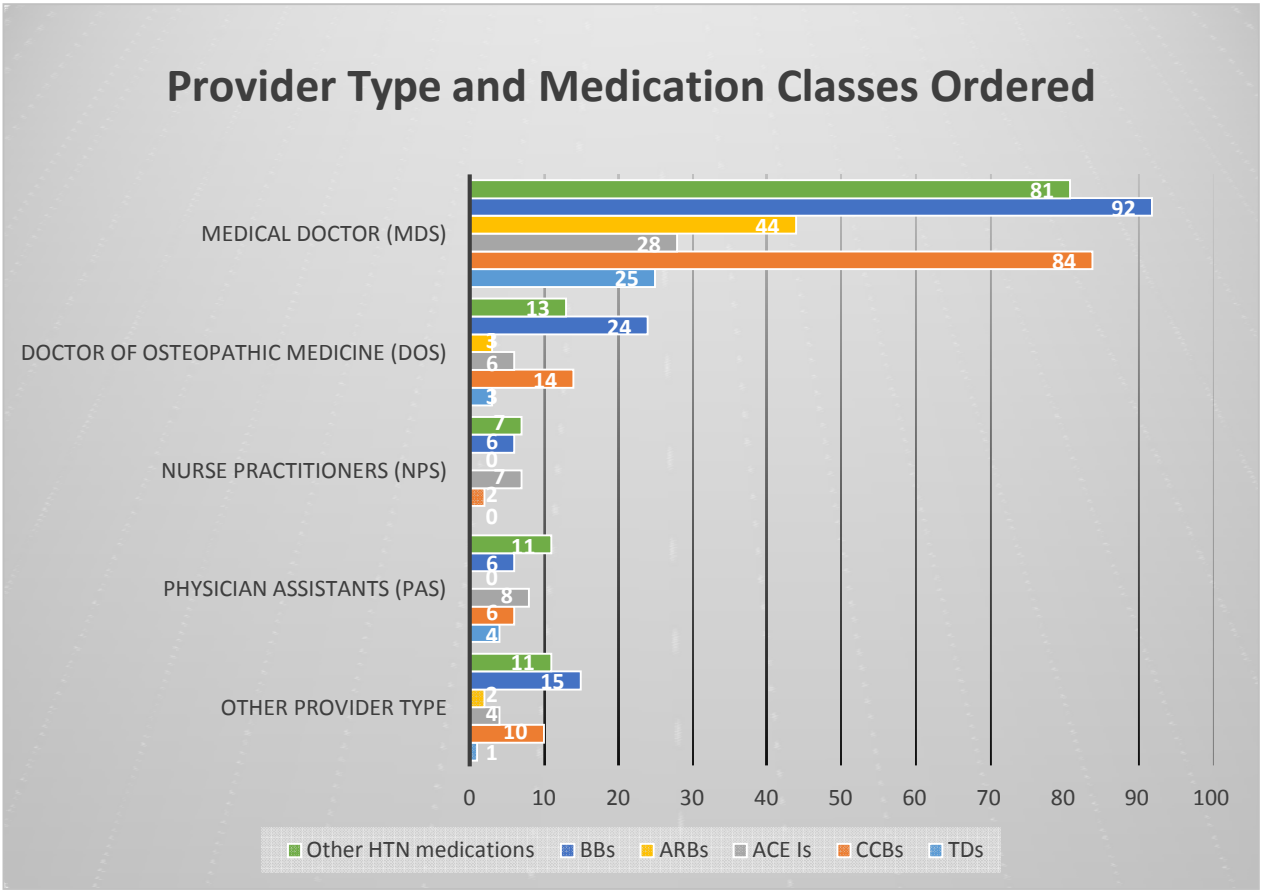

FIGURE 3. Provider Type and Medication Classes Ordered

TABLE 10. *Provider Type and Medication Class Ordering Percentage*

Provider Type/Medication Class	Raw Number	Percentage
Medical Doctors (MDs)	354	100%
Thiazide Diuretics (TDs)	92	25.99%
Calcium Channel Blockers (CCBs)	84	23.73%
Angiotensin Converting Enzyme Inhibitors (ACE Is)	28	7.91%
Angiotensin Receptor Blockers (ARBs)	44	12.43%
Beta Blockers (BBs)	25	7.06%
Other HTN medications	81	22.88%
Doctor of Osteopathic Medicine (DOs)	63	99.99%
Thiazide Diuretics (TDs)	24	38.1%
Calcium Channel Blockers (CCBs)	14	22.22%
Angiotensin Converting Enzyme Inhibitors (ACE Is)	6	9.52%
Angiotensin Receptor Blockers (ARBs)	3	4.76%
Beta Blockers (BBs)	24	38.1%
Other HTN medications	13	20.63%

TABLE 10 – *Continued*

Provider Type/Medication Class	Raw Number	Percentage
Nurse Practitioners (NPs)	22	100%
Thiazide Diuretics (TDs)	0	0%
Calcium Channel Blockers (CCBs)	2	9.09%
Angiotensin Converting Enzyme Inhibitors (ACE Is)	7	31.82%
Angiotensin Receptor Blockers (ARBs)	0	0%
Beta Blockers (BBs)	6	27.27%
Other HTN medications	7	31.82%
Physician Assistants (PAs)	35	100%
Thiazide Diuretics (TDs)	4	11.43%
Calcium Channel Blockers (CCBs)	6	17.14%
Angiotensin Converting Enzyme Inhibitors (ACE Is)	8	22.86%
Angiotensin Receptor Blockers (ARBs)	0	0%
Beta Blockers (BBs)	6	17.14%
Other HTN medications	11	31.43%
Other Provider Types	43	100%
Thiazide Diuretics (TDs)	1	2.33%
Calcium Channel Blockers (CCBs)	10	23.26%
Angiotensin Converting Enzyme Inhibitors (ACE Is)	4	9.3%
Angiotensin Receptor Blockers (ARBs)	2	4.65%
Beta Blockers (BBs)	15	34.88%
Other HTN medications	11	25.58%

Medication Classes Prescribed by Provider Specialty

Providers were then grouped together by specialty. The following practicing specialties were identified: Internal Medicine, Hospital Medicine, Cardiology, Renal, Endocrine, and Other Specialties (i.e., any specialty not in the aforementioned groups). Hospital medicine providers ordered the most HTN medications followed by Other Specialties. The Endocrine specialty did not order a single HTN medication throughout the participants' hospital stay. BBs and other HTN medications continued to be the most ordered drugs by most specialties. Renal and Other Specialties ordered CCBs the most, with rates of 21.88% and 26.72%, respectively. Cardiology ordered TDs more than any other specialty at a rate of 12.12%. See Figure 4 for complete results.

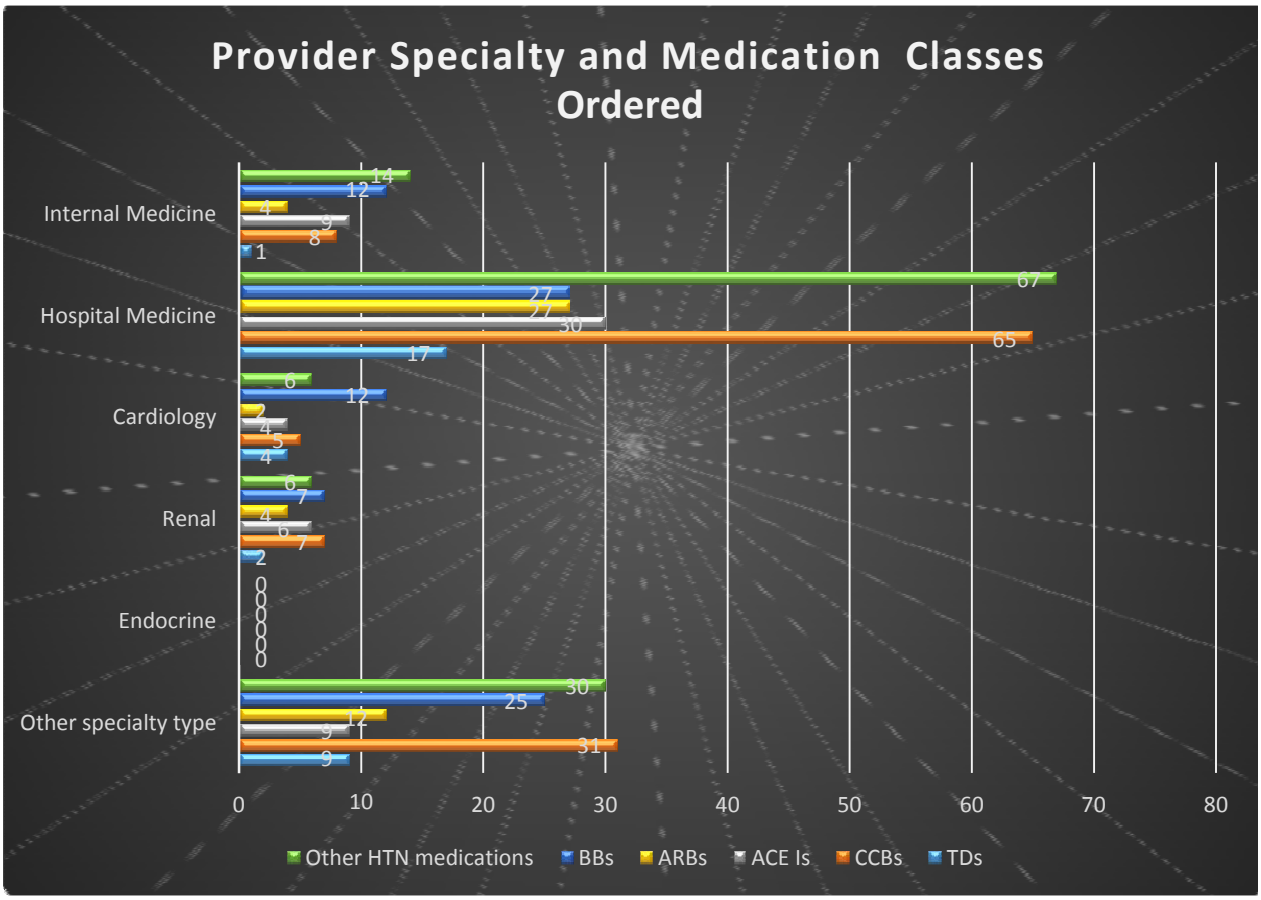

FIGURE 4. Provider Specialty and Medication Classes Ordered

Medication Classes Prescribed to Newly and Previously Diagnosed HTN Participants per JNC 8 Guideline Recommendations

Five participants were newly diagnosed with HTN in the identified sample size. According to JNC 8 Guideline Recommendation 7, appropriate pharmacological interventions for newly diagnosed AA adults with essential [primary] HTN are TDs and/or CCBs (James et al., 2014). Of the five participants newly diagnosed with HTN, two were prescribed no HTN medications upon discharge; two individuals were prescribed TDs and one an ACE I. See Table 11 for full data on newly diagnosed participants with HTN medications.

Two hundred twenty six participants were previously diagnosed with HTN from the sample. One hundred seventy nine participants had essential [primary] HTN with an ICD-10 diagnosis code of I10, while 47 participants had HTN and CKD with an ICD-10 diagnosis code of I12.9 (hypertensive CKD with stage 1 through 4 CKD) or I.12.0. Upon admission and at discharge all participants were prescribed a TD, CCB, ACE I, and/or ARB medication. On admission and discharge the most prescribed HTN medication class were CCBs, followed by ACE Is, ARBs, and TDs. See Table 12 for full data on previously diagnosed participants with HTN medications.

TABLE 11. *Newly Diagnosed Participants with HTN Medications*

5 Newly Diagnosed Participants with HTN	**Admission HTN Medications per JNC 8 Guideline Recommendations**	**Discharge HTN Medications**
Thiazide Diuretics (TDs)	0	2
Calcium Channel Blockers (CCBs)	0	0
Angiotensin Converting Enzyme Inhibitors (ACE Is)	0	1
Angiotensin Receptor Blockers (ARBs)	0	0

TABLE 12. *Previously Diagnosed Participants with HTN Medications*

226 Previously Diagnosed Participants with HTN	**Admission HTN Medications per JNC 8 Guideline Recommendations**	**Discharge HTN Medications per JNC 8 Guideline Recommendations**
Thiazide Diuretics (TDs)	45	35
Calcium Channel Blockers (CCBs)	70	78
Angiotensin Converting Enzyme Inhibitors (ACE Is)	66	50
Angiotensin Receptor Blockers (ARBs)	52	48

Medication Classes Prescribed by Diagnosis per JNC 8 Guideline Recommendations

One hundred eighty four participants, or 79.65% of the sample size, had an ICD-10 diagnosis code of I10 (primary [essential] HTN). Upon admission 30 participants (16.3%) were prescribed TDs and/or a CCBs. At discharge, 29 participants (15.77%) were prescribed a TD and/or CCB. See Table 13 for full data on TD/CCB medication rates on admission and discharge of individuals with an ICD-10 diagnosis code of I10 (primary [essential] HTN).

Forty seven participants, or 20.35% of the sample size, had an ICD-10 diagnosis code of I12.9 (hypertensive CKD with stage 1 through 4 CKD) or I12.0 (hypertensive CKD with stage 5 CKD or end stage renal disease). No participants at admission or discharge were prescribed an ACE I or ARB independently. Upon admission 20 individuals (42.55%) were prescribed an ACE I or ARB in conjunction with other antihypertensive medications. At discharge 16 participants (34.04%) were prescribed an ACE I or ARB with other antihypertensive medications. Additionally, five patients prescribed ARBs had an allergy to ACE Is. See TABLE 14 for full data on ACE Is/ARBs prescriptions rates on admission and discharge of individuals with an ICD-10 diagnosis code of I12.9 (hypertensive CKD with stage 1 through 4 CKD) or I12.0 (hypertensive CKD with stage 5 CKD or end stage renal disease).

TABLE 13. *TDs/CCBs Prescription Rates on Admission and Discharge of Individuals with HTN*

184 participants	**Admission Medications per JNC 8 Guideline Recommendations**		**Discharge Medications per JNC 8 Guideline Recommendations**	
	Raw Number	Percentage	Raw Number	Percentage
Thiazide Diuretics (TDs)	1	0.54%	2	1.09%
Calcium Channel Blockers (CCBs)	17	9.24%	19	10.33%
TDs & CCBs	0	0%	0	0%
TDs, CCBs, and other HTN drug classes*	12	6.52%	8	4.35%
TOTAL	*30*	*16.3%*	*29*	*15.77%*

*ACE Is, ARBs, BBs, diuretics, alpha-agonist, other antihypertensive medications

TABLE 14. *ACE Is/ARBs Prescription Rates on Admission and Discharge of Individuals with HTN and CKD*

47 participants	**Admission Medications per JNC 8 Guideline Recommendations**		**Discharge Medications per JNC 8 Guideline Recommendations**	
	Raw Number	Percentage	Raw Number	Percentage
Angiotensin Converting Enzyme Inhibitors (ACE Is)	0	0%	0	0%
Angiotensin Receptor Blockers (ARBs)	0	0%	0	0%
ACE Is and other HTN drug classes*	8	17.02%	5	10.64%
ARBs and other HTN drug classes*	12	25.53%	11	23.4%
TOTAL	*20*	*42.55%*	*16*	*34.04%*

*TDs, CCBs, BBs, diuretics, alpha-agonist, other antihypertensive medications

CHAPTER FIVE: DISCUSSION

JNC 8 Recommendation 7 states "[i]n the general black population, including those with diabetes, initial antihypertensive treatment should include a [thiazide diuretic] TD or [calcium channel blocker] CCB" (James et al., 2014). Of the initial sample size of 231 African American (AA) adult participants, 184 participants were diagnosed with hypertension (HTN). Of the 30 patients (16.3%) on admission receiving JNC 8 Recommendation 7 compliant care, one patient was prescribed a TD, 17 patients a CCB, and 12 patients on a TD or CCB in combination with another drug class upon. Regarding the 29 patients (15.76%) on discharge receiving JNC 8 Recommendation 7 guideline compliant care, two patients were prescribed a TD, 19 patients a CCB, and eight patients on a TD or CCB in combination with another drug class. From admission to discharge when TDs and CCBs were prescribed independently, compliance to JNC 8 Guideline Recommendation 7 increased, however when these medications were prescribed in conjunction with other antihypertensives compliance rates of Recommendation 7 decreased.

JNC 8 Recommendations 8 states "[i]n the population aged greater than or equal to 18 years with CKD, initial (or add-on) antihypertensive treatment should include an [angiotensin converting enzyme inhibitor] ACE I or [angiotensin receptor blocker] ARB to improve kidney outcomes. This applies to all chronic kidney disease (CKD) patients with HTN regardless of race or diabetes status" (James et al., 2014). Of the initial sample size of 231 AA adult participants, 47 participants were diagnosed with HTN and CKD. Twenty participants (42.55%) were prescribed an ACE I or ARB upon admission and 16 participants (34.04%) were discharged on an ACE I or ARB.

The results of this Doctor of Nursing Practice (DNP) project display overall low provider compliance to JNC 8 Guideline Recommendations when treating HTN in the AA adult population. This may further contribute to the growing rates and subsequent comorbidities and mortality rates in the AA adult population from HTN. Moreover, documentation regarding the rationale for HTN treatments implemented was largely absent; this has left more questions than answers regarding providers' prescribing practices. Several potential scenarios could alter provider-prescribing practices. This may include lack of tolerance to a medication, ineffectiveness of a medication, contraindication secondary to comorbidities or current medication regimen, deferring HTN management to the patient's primary care provider, or even years practicing and lack of familiarity of current HTN guidelines. Moreover, in-hospital providers may have ordered guideline adherent medications during the patient's stay but may have chosen to discontinue them secondary to their primary illness and contraindications in their care. Upon admission and discharge of the 231 participants BBs and other hypertensive medications compiled the greatest portion of HTN medications prescribed; these two drug classes were selected 51.45% of the time when ordering HTN medications. The disproportionate prescribing rates of non-guideline appropriate drugs questions if providers are knowledgeable, or even aware of, current guideline care and management of HTN within the AA adult population. JNC 8 Guideline Recommendations for HTN medication dosing strategies endorse introducing BBs and other antihypertensive agents, such as aldosterone antagonist, only if Strategies A, B, and C fail. Although 12 participants upon admission were prescribed a TD or CCB in combination with other HTN drugs, and eight participants were prescribed a TD or CCB in

combination with other HTN medications upon discharge, it is unknown if Strategies A, B, or C were first attempted.

Strategy A entails initiation of one medication and adjust to the maximum dose, then adding a second medication if needed. Strategy B initiates one medication and adds a second medication prior to reaching the maximum dose in the initial medication. In Strategy C providers introduce two medications simultaneously as either two separate pills or a combination pill (James et al., 2014). Other additional factors contributing to disproportionate prescribing rates of non-guideline appropriate drugs include clinical inertia and the presence of conflicting or multiple comorbidities may also contribute to poor compliance rates; however, the lack of documentation done by providers makes it unclear the underlying rationale for not appropriately prescribing guideline adherent pharmacological therapy.

Project Aim 1

The first aim of this project was to determine provider-prescribing rates of TDs and CCBs in newly diagnosed AA adults with HTN in hospitalized patients. Of the five newly diagnosed patients identified, none were prescribed a TD (0%), and two were prescribed a CCB (40%).

Project Aim 2

The second aim of this project was to determine if AA adults previously diagnosed with HTN were currently prescribed a TD and/or CCB medications. One hundred eighty four participants were identified as having preexisting HTN; 30 participants (16.3%) were prescribed a TD and/or CCB upon admission and 29 participants (15.77%) were prescribed a TD and/or CCB upon discharge. Per JNC 8 Guideline recommendations, patients with HTN should be

prescribed a TD or CCB. Although this recommendation has received a Grade B, meaning moderate evidence suggests benefit, (James et al., 2014); the aforementioned prescribing rates of TD and CCB medications are significantly low and display inconsistent patient management. Additionally, providers should indicate their rationale in forgoing evidence based clinical practice guidelines (CPGs).

Implications for Advanced Nursing Practice

The Essentials of Doctoral Education for Advanced Nursing Practice support and promote scientific underpinnings for practice, organizational and systems leadership for quality improvement, clinical scholarship and analytical methods for evidence based practice, and interprofessional collaboration for improving patient and population health outcomes (American Association of Colleges of Nursing [AACN], 2006). This DNP project has incorporated all of the aforementioned essentials, thus contributing to the advancement of nursing practice while improving patient outcomes. Improvement in medical record documentation, provider rationale for treatment selections, evaluation of provider knowledge of HTN CPGs, as well as data analysis and trending of prescribed medications form the foundation of addressing the treatment of AA adults with HTN.

Scientific Underpinnings for Practice

This DNP project demonstrated the utilization of a current practice issue and its evaluation via a scientific standard (i.e., JNC 8 Guideline Recommendations). The JNC 8 Guideline Recommendations are based in biology and genetics, combined with a historical trend to address a population at risk (AACN, 2006). Understanding and knowledge of the JNC 8 Guideline Recommendations is key to incorporate principles into practice. Furthermore,

understanding of the guidelines in conjunction with nursing science contributes to the foundation of nursing while advancing practice. NPs had the lowest prescribing rates of TDs and CCBs of any provider type (Figure 3); therefore, the JNC 8 evidenced based guideline recommendations, or scientific standard, needs to be better incorporated in the NP practice.

Organizational and Systems Leadership for Quality Improvement

Leadership and quality improvement is displayed in this project by targeting a vulnerable patient population with the goal of identifying disparities and developing solutions while simultaneously operating within an organization's policies and procedures. Delivery care model evaluation can aid in identification to improve system processes, which holds the organization accountable for change (AACN, 2006). While this project serves as a beginning to address HTN in AA adults, subsequent projects can examine other factors and corrections needed for quality improvement to occur.

Clinical Scholarship and Analytical Methods for Evidence Based Practice

Clinical scholarship promotes the "discovery of new knowledge" (AACN, 2006); as a result, new knowledge can provide new solutions for present and past problems. The problem of HTN in the AA adult population is old, however the treatment of this population is relatively new per JNC 8 Guideline Recommendations. This knowledge needs to be disseminated throughout nursing to effectively treat and manage HTN in this population. The method in which this occurs is in a humanistic, caring manner, rooted in literature and evidence based practice, which supports the epitome of nursing (AACN, 2006). This project presented relevant findings needed to prompt change in how providers manage HTN in the AA adult population, as current methods are ineffective. Additionally, presenting this data to healthcare providers may highlight

variances in practice methods; this will allow providers to refocus interventions in evidence based research rather than tradition or habit.

Interprofessional Collaboration for Improving Patient and Population Health Outcomes

Today's patient focused healthcare continuum is comprised of many professions to achieve optimal patient outcomes. This success is contingent on the multi-disciplinary approach with effective communication and collaboration of skills (AACN, 2006). This project demonstrates the necessity for provider collaboration in the appropriate management of AA adults with HTN; all prescribing providers need education and practice changes to help achieve improved outcomes in this population. Pharmacists can also be utilized as valuable resources when selecting specific medications within a drug class. Also, information technology professionals can implement alerts and considerations within electronic health records to help improve patient outcomes, as well as streamline records and charting to make data more accessible.

Project Challenges

The PI experienced extreme difficulties in gaining access to electronic medical records to complete the data collection portion of this project. Five different departments (Medical City Dallas Institutional Review Board, the Finance Department, the Information Technology Department, the Education Department, and the Nursing Research Department) were contacted to gain appropriate access, however, none were able to provide access. This major challenge caused a time delay of approximately six weeks and an uncertainty if the project could be completed. However, the PI was able to overcome this obstacle by continuing to network. A meeting with a nurse manager, who recently obtained his DNP degree, lead to the advisement to

contact the associate chief nursing officer (CNO) of Medical City Dallas. The PI e-mailed the associate CNO explaining the access problem and provided proof of Medical City Institutional Review Board approval letter. The next day the associate CNO called the PI stating she wanted to eliminate barriers in advancing nursing care/research and could help; within an hour of the conversation the PI had access to complete data collection.

Further research for similar DNP projects include analysis of specialty and provider type, particularly for non-physician type providers (i.e., nurse practitioners and physician assistants). Because the electronic medical record did not have providers' specialties labelled, this information was difficult to obtain, often times resulting in blank fields. This analysis could be beneficial in determining if provider type, provider specialty, or both have an impact in JNC 8 guideline recommendation pharmacological adherence. Also, knowing the ratio of physicians to nurse practitioners to physician assistants within the organization would also be useful in trending data; this could help providers collaborate and discuss their practice in what is successful versus unsuccessful treatment strategies, particularly when discussing nonpharmacological interventions with patients and their compliance with those interventions.

The electronic medical record system at Medical City Dallas, known as Meditech, needs to be streamlined and made more user friendly to obtain more accurate results. For Ms. Mindle to build a query and specify the inclusion and exclusion criteria and still receive results with the exclusion criteria shows the lack of accuracy of the Meditech system; this, subsequently, makes retrospective projects difficult to implement for fear of obtaining inaccurate data. Because the data needed to be manually extracted from 417 patients, data took significantly longer to obtain.

This could discourage future projects and limit the evolution of organizational decision making; ultimately this will cause a delay in patient management and achieving optimal patient outcomes.

Limitations of Study

Limitations of this project included the following: lack of generalizability, inaccurate medical record documentation, differentiation of black participants, and the presence of comorbidities.

Lack of Generalizability

Due to the small sample size, initially 417 and reduced to 231, the results of this project are not generalizable to all AA adults with HTN. Furthermore, this project occurred over a relatively short amount of time, three months, and results are only applicable to Medical City Dallas. Nevertheless, results obtained from this project can be utilized by Medical City Dallas providers in evaluating prescribing practices pertaining to AA adults with HTN. This information can be disseminated to providers in an effort to improve current practice.

Inaccurate Medical Record Documentation

The initial sample of 417 was obtained via electronic query built for patients that fit the project's inclusion criteria. However, when the PI began manually evaluating the participants' medical records many of them had exclusion criteria (i.e., ICU patient, oncology patient, dialysis patient, expired during hospital stay). It is not known how these participants were placed in the initial sample size. Many patients had lack of documentation regarding admission and discharge medications, or even history of HTN. Additionally, not all providers had their credentials visible in the medical record; this is why some are listed as *others* in the data reported.

Differentiation of Black Participants

Medical City Dallas has limited ethnicity and race choices for healthcare providers to select when admitting a patient to the facility. One of the choices is 'black,' which encompasses AAs as well as people of origin that may appear black, including Africans, Haitians, South Americans, etcetera. Furthermore, if health providers did not ask a patient's ethnicity and race providers assumed this information and selected the field they felt was appropriate. Upon manual evaluation of participants, the PI identified two individuals who were referred to as native Africans in the history and physical section and, subsequently, eliminated these individuals from the project. However, if the medical record did not differentiate the participants' ethnicity and race the individual was assumed to be AA with a black ethnicity and race selection.

Presence of Comorbidities

This project considered the comorbidities of DM and CKD since the JNC 8 Guideline Recommendations differentiate treatment in individuals with these disease processes. Other comorbidities, such as congestive heart failure, were not considered in the hypertensive medication management of participants. Existing comorbidities may account for alternative drug classes being prescribed in the treatment plan of some patients.

Other Considerations

Medication tolerance or interactions with previously prescribed drug therapy in participants was not considered in this project; there was not a way to obtain participants' prior HTN medication prescribing history (outside of current medications) to evaluate drug therapy that was used in the past. Patients may have had adverse reactions to medications providers initially wanted to order to manage HTN. As a result, patient medication intolerance may have

caused providers to alter their drug therapy selections. Patient insurance coverage could also play a factor in selecting HTN drug therapy, causing providers to be non-adherent to JNC 8 Guideline Recommendations. Lastly, certain specialties may have had a particular affinity to prescribe particular drugs classes over another; these considerations were not well documented.

Future Research

Several future research opportunities exist to continue the improvement and appropriate management of AA adults with HTN. These opportunities include assessing provider knowledge of the JNC 8 Guideline Recommendations, as well as patient adherence to guideline care, both pharmacological and nonpharmacological.

Conclusion

The AA adult population is disproportionately affected by HTN compared to the general adult population (CDC, 2016; Go et al., 2013). JNC 8 Guideline Recommendations 7 and 8 were developed to aid in appropriate treatment and management of hypertensive AA adults (James et al., 2014). The results of this DNP project display low provider compliance rates of appropriate pharmacological therapy in AA adults with HTN per JNC 8 Guideline Recommendations. This outcome highlights several potential reasons for the low adherence rates, including lack of documentation in medical records, lack of provider rationale for treatment selections, evaluation of provider knowledge of HTN CPGs, and data analysis and trending of prescribed medications. These aforementioned factors present the opportunity for further research to develop the root cause of overall low compliance rates to the JNC 8 Guideline Recommendations.

APPENDIX A:

DATA COLLECTION TOOL

Data Collection Tool

Participant Number	ICD-10 Diagnosis Code I10= 1 I12.9= 2 I12.0= 3	Newly Diagnosed with HTN Yes= 1 No= 0	Previously Diagnosed with HTN Yes= 1 No= 0	Age	Gender Male=1 Female=0	Drug Allergies Yes= 1 No= 0	HTN Meds on Admission None= 0 TD= 1 CCB= 2 ACE I= 3 ARB= 4 BB= 5 Other= 6	HTN Meds on Discharge None= 0 TD= 1 CCB= 2 ACE I= 3 ARB= 4 BB= 5 Other= 6	Provider Type MD= 1 DO= 2 NP= 3 PA= 4	Provider Specialty Internal Medicine=1 Hospital Medicine=2 Cardiology=3 Renal=4 Endocrine=5 Other=0	Diabetes No = 0 Type 1= 1 Type2= 2	CKD No = 0 Stage 1= 1 Stage 2= 2 Stage 3= 3 Stage 4= 4 Stage 5= 5
1												
2												
3												
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