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Management of Hypertension in African Americans as Compared to Non-African Americans

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Nursing 997 – Independent Study Paper

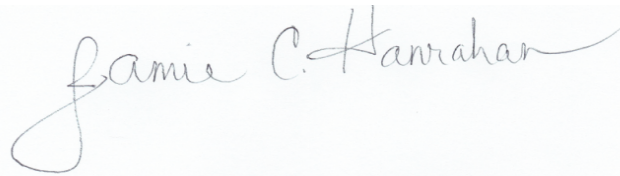
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Degree Master of Science

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A handwritten signature in cursive script that reads "Jamie C. Hanrahan". The signature is written in dark ink on a light-colored background.

Signature Jamie C. Hanrahan

Date April 7, 2016

Abstract

According to the National Health and Nutrition Examination Survey (Nwankwo, Yoon, Burt, & Gu, 2013), hypertension affects approximately 70 million Americans and is the most commonly treated condition seen in primary care settings in the United States. The cost of hypertension on the health care system is estimated to be \$46 billion each year, which includes services, medications, and missed days from work (Mozzafarian et al., 2015). Furthermore, according to the report published by the American Heart Association (AHA) (Mozzafarian et al., 2015), African Americans make up the largest population of those affected by both controlled and uncontrolled hypertension. It is estimated that 43% of African American males, as compared to 33.9% of white non-Hispanic American males have hypertension (Mozzafarian et al., 2015). In addition, 45.7% of African American women have hypertension, as compared to 31.3% of white non-Hispanic American females (Mozzafarian et al., 2015). According to the AHA (2014a), African Americans have a higher average blood pressure than non-African Americans. They have also been found to develop hypertension and associated complications at an earlier age compared to non-African Americans (Mozzafarian et al., 2015). If left uncontrolled, hypertension can lead to end target organ damage and death. This creates a burdensome cost to the U.S. health care system that may otherwise be avoided with closer screening and control of hypertension in all populations.

This case describes a 48-year-old African American female who presented to the clinic for management of her hypertension. Therapy was initiated with lisinopril at a previous office visit according to the patient's medical record. Lisinopril, an angiotensin-converting enzyme inhibitor (ACEI), is often used to treat hypertension but it is imperative to consider if this is the best treatment for this particular patient using the most current clinical guideline

recommendations. The recently released Joint National Committee (JNC 8) guideline recommends initiating African Americans with either a thiazide diuretic or calcium channel blocker when treating uncomplicated hypertension (James et al., 2014). Therefore, this report sought to investigate why differences in hypertension treatment exist between African Americans and non-African Americans.

Management of Hypertension in African Americans as Compared to Non-African Americans

Background

Hypertension is the most frequently treated condition in primary care settings in the United States (Nwankwo, Yoon, Burt, & Gu, 2013). When left uncontrolled, elevated blood pressure can lead to complications including myocardial infarction, renal failure, stroke, heart failure, or even death (Centers for Disease Control and Prevention, 2015). Patients of African ancestry often have more treatment resistant hypertension that results in organ failure and death at a faster rate than populations of non-African ancestry (Brewster & Seedat, 2013).

The gold standard for management of hypertension is the guideline released by the Joint National Committee (JNC), which consists of a panel of experts in primary care, cardiology, nephrology, hypertension, pharmacology, and evidence-based medicine (James et al., 2014). The Eighth Joint National Committee (JNC 8) guideline was published in December 2013. This most recent hypertension guideline gives evidenced-based recommendations on treatment thresholds, goals, and medications (Armstrong, 2014).

This case report describes a 48-year-old African American female who presented to the clinic for a one-month follow-up after initiating anti-hypertensives. The patient was started on an angiotensin-converting enzyme (ACE) inhibitor called lisinopril at 20 mg daily. According to the JNC 8 hypertension guideline, lisinopril is not recommended as a first-line medication to treat hypertension in African Americans (James et al., 2014). Furthermore, the preferred initial treatment for this particular patient with uncomplicated hypertension would be a calcium channel blocker (CCB) or a thiazide diuretic (James et al., 2014). Because treatment for hypertension varies depending on different patient characteristics, it is important to understand why

individuals of certain ethnicities respond differently to treatments and how that ultimately guides decision-making as a clinician.

Case Report

Patient Information

A 48-year-old African American female presented to the clinic for a one-month follow-up after starting treatment for hypertension. The patient speaks English fluently and is a good historian when discussing her medical care. She has no known allergies and is current on all immunizations.

Current Medications

Four weeks ago, she was started on lisinopril 20 mg by mouth once daily as an initial treatment for hypertension. Patient reports that she has been compliant in taking the medication as prescribed. Other medications that this patient routinely ingests are women's daily multivitamin and acetaminophen as needed for pain.

Past Medical and Surgical History

Hypertension is her only known past medical history and no other co-morbidities. Surgical history consists of cholecystectomy and tubal ligation. Family history was not reviewed at this clinic appointment.

Health Presenting Illness

In addition to lisinopril, the patient has been following the DASH diet (Dietary Approaches to Stop Hypertension) as recommended at her previous clinic appointment. She has not found it difficult to reduce the amount of sodium in her diet and she has been focusing more on foods rich in nutrients such as fruits and vegetables. The patient has also been monitoring her

blood pressure at home every morning upon waking and she reports that it averages 140-148 / 70's mm Hg.

Review of Systems

In addition to following-up on her blood pressure, the patient does report that she has noticed a persistent, dry nagging cough that started approximately three to four weeks ago. She has not had a recent upper respiratory infection. The patient denies having symptoms of a headache, sinus pressure, nasal congestion, dyspnea, shortness of breath, or chest pain. She has not noticed any reflux, fatigue, fever, or unexpected weight changes. She denies having palpitations, lightheadedness, peripheral edema, rash, muscle cramping, urinary changes, abdominal pain or diarrhea.

Social History

The patient has no history of tobacco use and no recent exposures. She also denies any recent exposure to environmental allergens or irritants. Alcohol use consists of one to two glasses of wine four days per week. The patient has never used illicit drugs.

Physical Examination

The patient's blood pressure today is 142/78 mmHg with a heart rate of 72 beats per minute. She is smiling, alert and does not appear to be in any acute distress throughout the appointment. No abnormal findings were detected with examination of the head, ears, eyes, nose, and throat. Upon auscultation of her heart, normal S1, S2 sounds were heard with no rubs, gallops, or murmurs. With inspection of the neck, the trachea was midline, no thyromegaly, or carotid bruit. The patient's lungs had symmetrical expansion and clear sounds in all fields. This examiner heard a rare dry cough from the patient throughout the assessment. No peripheral edema is noted today and the distal pulses are strong, rated +2.

Laboratory Testing

Due to an inability for this examiner to verify if laboratory testing was performed before initiating treatment four weeks ago, it would be beneficial to have a complete blood count and basic metabolic panel today in order to evaluate her blood components along with liver and kidney function. Labs indicate a mildly elevated blood glucose at 120 mg/dL but the patient was not fasting prior to the test. In addition, she had a slightly elevated BUN at 28 mg/dL that could be indicative of mild dehydration or common side effect of lisinopril. All other laboratory results were within the normal expected range for this patient today.

Assessment, Plan, and Supporting Evidence

In accordance to the JNC 8 guidelines (James et al., 2014), it is recommended that all patients between the ages of 18-60 have a blood pressure goal of less than 140/90 mmHg. Additionally, it is recommended that African Americans of any age who are found to have elevated blood pressure be started on either on a CCB or thiazide diuretic as long as the patient does not have chronic kidney disease (CKD). In the event that an African American patient has CKD, then the JNC 8 guideline recommends starting treatment with an angiotensin-converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) (James et al., 2014). Therapeutic lifestyle modifications would also be encouraged along with medication therapy.

Therefore, in order to provide the patient with individualized and evidence-based care, according to the JNC 8 guideline, it was recommended that the patient in this case study stop lisinopril and start a thiazide diuretic. According to an article by Allan, Ivers, & Padwal (2012), chlorthalidone, a thiazide diuretic, has been shown in several trials to be more effective at reducing systolic blood pressure than other commonly used thiazides such as hydrochlorothiazide due to its longer half-life. In addition, Allan, Ivers, and Padwal (2012)

recommended patients with hypertension be treated with chlorthalidone at 12.5mg daily, which can be increased to 25mg to control blood pressure. In regards to the patient in the case study, it was recommended she be prescribed chlorthalidone 12.5mg once daily and return to the clinic in one month for a follow up visit. If the patient's blood pressure remained above goal at that time, the medication could be increased. Discontinuing the lisinopril will likely eliminate the common side effect of a nagging cough, which she has been experiencing (Epocrates, 2016). The patient is also encouraged to continue healthy lifestyle modifications such as home monitoring of her blood pressure, the DASH diet, increasing activity, and decreasing alcohol intake (American Heart Association, 2014).

Literature Review

A literature review was performed using the PubMed and CINAHL databases in addition to articles retrieved from the Chester Fritz Library. The review was primarily limited to years 2010 – 2016, but a few outlier articles were included for pertinent background information related to the development of JNC guidelines. The purpose of the literature review is to evaluate the rationale for separating hypertension treatment by African Americans versus non-African Americans as recommended by the JNC 8 guideline.

JNC 8 Development

Davis (2015) gives an overview of the JNC 8 recommendations that was released in early 2014. The development of the JNC 8 is based on the completion of an evidence-based meta-analysis. The studies were from 1966 to 2009 with a final review of the evidence in 2013 by the committee (Davis, 2015). The definition of hypertension remains the same as it did for the JNC 7 which is a systolic blood pressure greater than 140 mm Hg and diastolic pressure over 90 mm Hg. The three questions addressed by the JNC 8 were 1) when to start anti-hypertensives, 2)

what is the blood pressure goal to improve outcomes, and 3) which specific drug class should be chosen for a specific patient to decrease any undue harm (Davis, 2015). The JNC 8 guideline specifies treatment recommendations based on “age, blacks versus non-blacks, presence of diabetes or CKD” (James et al., 2014). Under the new guideline, adults less than age 60 should be initiated on anti-hypertensives for a systolic blood pressure (SBP) greater than 140 or diastolic blood pressure (DBP) greater than 90 mm Hg. For patients over the age of 60, the threshold is increased to a SBP 150 mm Hg unless they are in a high-risk category, which would include those who are black or who have kidney disease, diabetes, cardiovascular disease, or a history of stroke. Patients that have any of these risk factors are recommended to have a blood pressure goal of <140/90 mmHg despite their age (Davis, 2015). The seventh recommendation outlined by the JNC 8 states that blacks should be initially started with a CCB or thiazide diuretic to treat hypertension whether or not they have diabetes. The only exception is blacks that have chronic kidney disease, for which the recommended initial treatment is an ACEI or ARB (Davis, 2015). The JNC 8 has devised three strategies in the event that the initial medication does not provide the preferred outcome. Those strategies are to either maximize the dose of the initial drug before adding a second agent from a different class, adding a second agent from a different class and then slowly titrating both medications (one at a time), or lastly start with two drugs at once from different classes and titrate up before adding a third agent (Davis, 2015). It is of importance to note that ACEI and ARBs should not be combined in any of the strategies (Davis, 2015).

The Antihypertensive and Lipid-lowering Treatment to Prevent Heart Attack Trial (ALLHAT) was a very large scale, randomized, double-blinded clinical trial that took place from 1994 through March 2002. Published in 2002, findings indicated that thiazide diuretics were superior to CCB and ACEI in several outcomes including heart failure, stroke, and heart attacks

specifically for the African American population (Langan & Jones, 2015). Thiazide diuretics had improved outcomes for African Americans with and without diabetes. A significant difference in the risk for stroke and combined cardiovascular disease was observed when looking at lisinopril versus chlorthalidone treatment for African Americans (Furberg et al., 2002). The relative risks were in favor of using chlorthalidone, a thiazide diuretic, rather than lisinopril for African American patients with hypertension (Furberg et al., 2002). Based on a confidence interval of 95%, “the relative risks were 1.40 and 1.00 for stroke and 1.19 and 1.06 for combined CVD” (Furberg et al., 2002, p.2994). Data from the ALLHAT showed that, although CCB do not improve heart failure outcomes as well as thiazides, they are just as effective in anti-hypertension management so are also a recommended first line treatment for African American patients (Furberg et al., 2002). It is important to note that ALLHAT provided much of the framework with which developed the JNC 8.

Biological Non-Modifiable Differences

With keeping the JNC 8 recommendations in mind, it is imperative to discuss the biological differences between African Americans and non-African Americans that would influence the management of hypertension among ethnicities. In other words, what is it about the genetic makeup of African Americans that determines a change in the treatment regimen as compared to other ethnicities? These biological differences could manifest by an earlier age onset of hypertension, more aggressive hypertension disease course, physiological drug response to medication, or more resistant hypertension for African Americans. An article published by Brewster & Seedat (2013) explains that hypertension in African Americans is “often more severe, more resistant to treatment, and leads to earlier end organ damage and premature death” as compared to non-African American populations. The CDC (2015) states that high blood

pressure increases the risk for life-threatening conditions such as heart attacks, strokes, heart failure and kidney disease. Therefore, it is an understanding that organ damage will be seen if hypertension develops at an earlier age in African Americans as compared to non-African Americans.

Many potential biomarkers affecting the differential drug response of African Americans to anti-hypertensives were discussed in a review by Brewster & Seedat (2013). The authors, Brewster & Seedat (2013), performed a systematic review in order to explain why patients of African ancestry have better outcomes with CCB and thiazide diuretics as compared to ACEI and beta-adrenergic blockers when treating hypertension. The review consisted of 3,763 papers including 72 reports that considered the aforementioned classes of drugs. These included variations in gene encoding enzymes (specifically cytochrome P450), salt sensitivity, low plasma renin activity, and low nitric oxide bioavailability (Brewster & Seedat, 2013). At the time of publication, the authors concluded there was no data to explain why patients of African descent respond more favorably to certain classes of anti-hypertensives than others.

Flack, Nasser, & Levy (2011) published an article stating that the renin-angiotensin system seems to have an influence on the responsiveness of African Americans to certain classes of anti-hypertensives as evidenced by use of diuretics when compared with ACEI. Flack, Nasser, & Levy (2011) also postulate that African Americans have lower levels of available nitric oxide than non-African Americans, which affects the vascular contractibility. The decreased contractibility may require the majority of African Americans to be treated with a combination therapy of anti-hypertensives rather than monotherapy due to more resistant hypertension according to Flack, Nasser, & Levy (2011). The authors advise that at least one of those drugs in

the combination therapy should either be a CCB or thiazide diuretic (Flack, Nasser, & Levy, 2011).

An article by Flack et al. (2010) points out that functional and structural abnormalities of the vasculature in African Americans has been seen even under normotensive conditions. Documented thickening of the intima-media results in increased vessel rigidity along with decreased ability to respond under stimuli. If the vasculature is not responding appropriately under daily circumstances, then target organ damage may occur (Flack et al., 2010). African Americans disproportionately have higher rates of diabetes mellitus and chronic kidney disease when combined with hypertension increases their morbidity and mortality (Flack, Nasser, & Levy, 2011). The authors mention that, although there have been no determined unique factors in the African American populations, there are tendencies that occur that may increase the prevalence of hypertension.

Kaplan and Victor (2010) discussed that the prevalence of hypertension in African Americans could be caused by 18 genotype and intermediate phenotype differences. This genetic makeup is thought to make this population more sensitive to salt (Kaplan & Victor, 2010). The theory hypothesizes that slaves developed an enhanced ability to conserve salt on long ocean voyages enabling them to survive conditions causing diarrhea and vomiting. As a result, consuming high salt foods increases the blood pressure. Flack et al. (2010) notes that over 50% of both “blacks and whites” will exhibit salt sensitivity, which is considered a reversible BP phenotype. This manifests as a rise in BP during salt administration or fall in BP with salt restriction (Flack, Nasser, & Levy, 2011). The authors suggest that a CCB may be more effective at lowering blood pressures with salt-sensitive patients consuming a diet high in salt (Flack et al., 2010).

Advanced age is a risk factor for developing high blood pressure as vessels become more rigid contributing to an increased pressure throughout the cardiovascular system (AHA, 2014b). As previously stated, African Americans are known to develop hypertension at an earlier age when compared to their non-African American counterparts and have higher incidence rates of stroke and end-stage renal disease (Harman et al., 2013). The Jackson Heart Study, which was published in 2013 by Harman et al., looked at a community-based cohort of 5301 African Americans living in Jackson, Mississippi. The authors noted significant control of hypertension among this group with thiazide-like diuretics and that CCB showed a lower rate of BP control (Harman et al., 2013) in comparison to the thiazides. More data may need to be obtained, as the sample taking a CCB was relatively small at 216 during examination 1 and then decreased to 122 subjects by examination 2 (Harman et al., 2013). Nevertheless, it is important to keep in mind that earlier aggressive treatment may be warranted in African American patients to decrease their risk for organ failure, stroke, and death. Williams, Nicholas, Vaziri, & Norris (2014) addresses the importance of providers considering multiple factors when treating African American patients with hypertension including age, gender, ethnicity, and co-morbidities. Treatment should be multi-modal including lifestyle modifications, addressing socioeconomic concerns, and often using two or more anti-hypertensive agents. In conclusion, the treatment plan as described by Williams, Nicholas, Vaziri, & Norris (2014), “should be guided by individual patient response, coexisting risk factors and potential sociocultural considerations such as cost of medications and insurance coverage, which affect adherence to both pharmacologic and non-pharmacologic interventions”.

Modifiable Factors

According to Flack, Nasser, and Levy (2011), blood pressure control rates are significantly lower among the African American populations when compared to other ethnicities. This could be multi-factorial rather than just laying blame on the current treatment choice. Those factors might include access to care, perceived racism, socioeconomic status, support system, knowledge on hypertension, adherence to treatment, substance abuse, mental illness, cultural diversity, and obesity (CDC, 2014).

Obesity is a factor that occurs more commonly among the African American population when compared to Caucasian Americans (Flack, Nasser, & Levy, 2011). The extra adipose tissue causes a release in cortisol, aldosterone, and is more resistant to anti-hypertensive therapies (Redline et al., 1997). Obstructive sleep apnea can be another factor leading to uncontrolled hypertension and is often associated with obesity as well. Sleep apnea has been found to be more prevalent in the African American population and results in a nocturnal blood pressure that does not follow its normal fluctuating pattern (Redline et al., 1997).

Case Report Learning Points

- Initial drug therapy in African American patients with uncomplicated hypertension is a thiazide diuretic or a calcium channel blocker per the JNC 8 guidelines
- Initial drug therapy in African American patients with complicated (chronic kidney disease, heart failure, CVA) is an ACEI or ARB per the JNC 8 guidelines
- African Americans have been shown to develop hypertension at an earlier age that is more resistant to treatment. When left uncontrolled, the hypertension has an increased risk of target organ failure and death. Due to this, more aggressive is

recommended such as combination therapy rather than mono-therapy (Flack, Nasser, & Levy, 2011).

- Non-modifiable factors that have been considered to create the difference in hypertension and treatment recommendations between African Americans and non-African Americans are gene variations leading to salt sensitivity, vascular contractibility, renin levels, and nitric oxide availability.
- Modifiable factors that are prevalent in the African American population include health care access, hypertension education, substance abuse, mental illness, obesity, OSA, cultural views, poor socioeconomic status, adherence to treatment, and perceptions of racism.

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