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Medication Adherence and Intervention to Create Success in Hypertensive African Americans in a Rural Setting

Laneita Davis

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Medication Adherence and Intervention to Create Success in Hypertensive African Americans in a Rural Setting

Laneita Davis, FNP-BC, DNP-candidate

Prepared as partial fulfillment of the requirements for

Doctor of Nursing Practice degree

Belmont University College of Health Sciences and Nursing

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Acknowledgments

First, I would like to give praise and thanks to my Lord and Savior Jesus Christ for giving me the strength to endure this race. Without my faith in God, this task would not have been possible. I would like to express my sincere gratitude to my advisor, Dr. Linda Wofford, for the continuous support of my DNP study and research, for her patience, motivation, enthusiasm, and immense knowledge. Her guidance helped me in all the time of research and writing of this DNP scholarly project. I could not have imagined having a better advisor and mentor.

I would like to express my appreciation and thanks to Dr. Hutchins, you have been a tremendous mentor for me. I would like to thank you for encouraging my research and for allowing me to grow as a doctoral student. I would also like to thank Dr. Wyant for helping me with the statistics portion of my project and helping me to see the larger picture even at hardship. I also want to thank the members of my defense committee for letting my defense be an enjoyable moment, and for your brilliant comments and suggestions, thanks to you.

To my family and friends, thank you for listening, offering me advice, and supporting me through this entire process. To my four classmates, Lauren, Erin, and Susan, when we started this journey we were strangers, now you are my sisters. Thank you for your encouragement, and support. When I felt like giving up, you gave me the strength to keep going.

Thanks to my parents, Mr. and Mrs. Jake Anderson Jr. Words cannot express how grateful I am for all of the sacrifices that you’ve made on my behalf. Your prayer for me was what sustained me thus far. To my daughter Olivia, thank you for allowing me time away from you to research and write. You deserve a trip to Disney! Finally, to my caring, loving, and
supportive husband Oliver: my deepest gratitude. Your encouragement when the times got rough are much appreciated and duly noted. You are truly the wind beneath my wings
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Scholarly Project Introduction

Hypertension is a chronic disease that has been a major problem in the African American community for decades. Although numerous research studies have examined interventions to combat this disease, there has been very little research published that focused on African Americans with hypertension in a rural setting. Rural residents experience many difficulties in accessing healthcare services. This difficult access is a disadvantage that results in higher morbidity and mortality rates compared to those of their urban counterparts. Being from a small town in Mississippi, I have witnessed first hand the many barriers that are encountered. Individuals who live in a rural community may have limited access to healthcare providers. Residents may need to travel greater distances for healthcare, and the healthcare facilities in these areas are small and oftentimes provide services only during particular hours. The main objective of this DNP scholarly project was to evaluate a strategy to motivate African Americans in rural communities to improve hypertension control as one step toward improved involvement in their personal health.

This journey began with a synthesis of literature, which focused on reviewing the barriers associated with medication non-adherence and interventions used to improve blood pressure control. Once the information was gathered and the gaps were identified, the direction of the scholarly project was clear. After clarifying the purpose of the project, work began to select a theoretical framework for the project. The second paper describes the Integrative Model of Behavior Change and the three-step process used to motivate and encourage behavior change. With the purpose clearly defined and a strong theoretical foundation, the scholarly project was planned, implemented, evaluated, and disseminated. The final paper describes that process.
The work reflected in these papers is a beginning with the potential to positively impact the health of African Americans with hypertension in a small rural community. Perhaps the beginning work will spread beyond this single community. The author is encouraged about the potential of this work to continue positive influence on health.
Barriers to Medication Adherence and Interventions Used to Create Success in Hypertension: A Synthesis of Literature

Laneita Davis, FNP-BC, DNP-candidate

Belmont University
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Abstract

Background: Rates of medication adherence are low among hypertensive blacks despite numerous interventions to increase their adherence. Purpose: The aim of this paper was to conduct a review of literature to identify the published barriers to medication adherence in African-American patients with hypertension and to review the published interventions and strategies used to create success. Methods: A systematic computer search of qualitative and quantitative studies was performed that examined factors associated with medication adherence and interventions used in hypertensive African Americans from 2001 to 2013. Studies were included if medication adherence was either the primary or secondary outcome variable. Results: Selected studies (n = 27). Conclusion: Barriers to medication adherence included patient, therapy, and provider related barriers. Interventions that were associated with medication adherence included three main categories: pharmacy based, nurse led, and patient related.

Keywords: hypertension, medication adherence, African Americans, interventions
One in four adults has hypertension (HTN), which highlights the prevalence of HTN as a wide spread problem (Fernandez, et al., 2011). African Americans have a higher prevalence and greater severity of HTN than do other minorities and Caucasians. The prevalence of HTN in African Americans is among the highest in the world. HTN develops earlier in life and average blood pressures (BPs) are much higher in African Americans than in Caucasians. African Americans also have higher rates of stage-3 HTN, causing a greater burden of HTN complications (Artinian, Washington, & Templin, 2001). Although scientific evidence has established an array of both non-pharmacologic and pharmacologic strategies that reduce BP, the rate of awareness, treatment, and control of HTN in the US population is declining, increasing danger for African American in particular (Frinkelstein & Cha, 2009). Non-adherence to prescribed medications threatens the health and well-being of patients and has costly financial implications. Medication non-adherence causes the death of nearly 125,000 Americans every year and has been linked to an estimated 10% of hospital and 23% of nursing-home admissions (Migneault, Dedier, Wright, Heeren, Campbell, Morisky, Rudd, & Friedman, 2012).

According to a 2003 report by the World Health Organization (WHO), medication adherence is the extent to which a person’s behavior in taking medications corresponds with the agreed communication of their health care provider (Brown & Bussell, 2011). Therefore, medication adherence is one of the most important factors in keeping the vital link between the treatment and the therapeutic outcomes in medical care. To achieve better BP control in African Americans, optimal medication adherence must be achieved. Unfortunately, medication non-adherence rates are high among African Americans, and there is indication that non-adherence rates for African American are worse when compared with Caucasians (Artinian et al., 2001). Non-adherence has been associated with misunderstanding of the condition, perceived
improvement in health, worsening in health, general disapproval of medications, and concern over side effects (Nair, et al., 2011). Many of the instances of patients not taking medicines to minimize side effects are pragmatic. For the majority of patients who have no symptoms with hypertension, the fact that they do not feel unwell may encourage non-adherence. Side effects may be unacceptable in a condition that is asymptomatic. The number of medicines prescribed may also influence adherence, with a reduction in compliance as the regime becomes more complex (Artinian et al., 2001). The aim of this paper was to conduct a review to identify published barriers to medication adherence in African-American patients with hypertension and to review the published interventions and strategies used to create success.

**Methods**

The MEDLINE, CINAHL (Cumulative Index to Nursing and Allied Health), and Academic Search Premier databases literature search was limited to English articles published between 2003 and 2013 using the following terms: *medication adherence, interventions, hypertension* and *African Americans*. Additional references were obtained from citations within the retrieved articles. Qualitative or quantitative studies that identified barriers to medication adherence in African Americans and the interventions used to create success were the major focus of this literature review. Studies that examined racial disparities in medication adherence and reported on factors associated with adherence in African Americans were included in this literature review. Inclusion criteria were: 1) African Americans with hypertension, 2) prescribed medication treatment for high blood pressure, and 3) peer-reviewed articles. The majority of articles screened and excluded were quantitative studies that did not measure medication adherence as a study outcome.
Results

A total of 56 citations from the databases were identified. After screening the abstracts for their relevance and eliminating duplicate records, 22 articles were reviewed. Another five articles were added after reviewing the references of the selected literature. The final number of articles included in this review was 27. Ten (10 of 27, 37%) examined patient related barriers to medication adherence (Table 1). Four studies (4 of 27, 15%) examined therapy related barriers (Table 2), and four studies (4 of 27, 15%) examined provider related barriers to medication adherence (Table 3). There were seven studies (7 of 27, 30%) that examined interventions used to increase medication adherence. Three (3 of 7, 43%) examined patient related interventions (Table 4). Two (2 of 7, 30%) examined nurse-based interventions (Table 5), and two (2 of 7, 30%) examined pharmacy related interventions (Table 6). Some studies fit in multiple sections.

Patient-related Barriers

Gender

According to Courtenay, McCreary, and Merighi (2002), men are less likely than women to engage in a variety of preventive and self-care techniques, and the failure to do so contributes to men’s increased health risks. Not only are men less likely than women to restrict their activities or stay in bed when they are suffering from acute or chronic conditions, but also they are less likely to persist in caring for a major health problem (Courtenay et al., 2002). In their cross-sectional study, Shea and colleagues (2002) found that men were more likely to be nonadherent to their antihypertensive medications than were women, and that women are more likely than men to engage in a variety of health-promoting behaviors and healthier life-style patterns. Four additional articles found no association between gender and medication adherence (Lague, et al.,
MEDICATION ADHERENCE


Knowledge

It is arguably, surprising to discover that patients with a chronic condition, such as hypertension, lack basic knowledge about its potential risks and medication’s positive role even in the absence of symptoms. The patient’s knowledge and awareness of hypertension was significantly associated with compliance to medication for hypertension (Al-Meza, Al-Muhailije, Khalfah, & AL-Yahya, 2009). This correlation highlights the importance of health education to increase the knowledge of hypertension in order to improve the patient’s compliant behavior. Patel and Taylor (2002) report that patients who knew the importance of compliance had a significantly higher compliance rate than those who were ignorant of that aspect. Findings from the qualitative studies reported themes that described patients who believed that the absence of HTN symptoms influenced them to become nonadherent (Ferdinand, 2009; Gascon, Sanchez-Ortuno, Llor, Skidmore, & Saturno, 2004; Lukoschek, 2003). In a cross-sectional study examining comorbidities and medication adherence in blacks, Lague and colleagues (2009) found that those patients having stage 2 HTN (either systolic BP >159 mm Hg or diastolic BP >99 mm Hg) were more likely to have better adherence. Stage 2 hypertension is severe and requires immediate medical attention. Without medication, serious complications can occur such as blood vessel rupture, swelling of the brain and kidney failure (Lague et al., 2009). If the patient were to experience any symptoms at this stage, they may encounter dizzy spells, blurry vision (visual disturbance), headache or nausea. See Table 1.
**Therapy-related Barriers**

Therapy-related factors include the complexity of the medical regimen, duration of treatment, frequent changes in treatment, and adverse effects (Fongwa, Evangelisa, Hays, Martins, Elaghoff, Cowan & Morisky, 2008). Studies examining therapy-related factors to medication adherence among hypertensive African Americans have been primarily qualitative. In these qualitative studies, patients have described medication adverse side effects as causing adjustment to antihypertensive medication dosages including discontinuation (Gascon et al., 2004). Complex treatment is believed to threaten the patient’s compliance. However, compliance does not seem to correlate with the number of drugs prescribed, but the number of dosing times every day of all prescribed medication (Ren, Kazis, Lee, Zhang, & Miller, 2002). Medications with once-daily dosing may be preferable to medications with multiple doses per day because minimizing the frequency of dosing has been shown to improve adherence (Schroeder, Fahey, & Ebram, 2004). See Table 2.

**Provider-related Barriers**

Healthcare providers play an integral role in medication adherence. Patients who trust their physicians have better two-way communication with their physician. Trust and communication are two elements critical in optimizing adherence. Numerous studies show that provider trust is more important than treatment satisfaction in predicting adherence to prescribed therapy and overall satisfaction with care (Piette, Heisler, Krein, & Kerr, 2005). Physician trust correlates positively with acceptance of new medications, intention to follow physician instructions, perceived effectiveness of care, and improvements in self-reported health status (Piette, et al., 2005). Haskard and DiMatteo (2009) found that there is a 19% higher risk of non-adherence
among patients whose physician communicates poorly than among patients whose physician communicates well. Statistically, the odds of patient adherence are 2.26 times higher if a physician communicates well (Haskard & DiMatteo 2009). A qualitative study by Lukoshek (2003) found that patients describing their beliefs that quality of communication with their healthcare providers was an important influence on their medication adherence. Quantitative studies supported qualitative findings and have reported that patients with healthcare providers who are empathetic, nonjudgmental, and collaborative are significantly more likely to adhere to their medications (Odedosu, Schoenthaler, Vieira, Agyemang, & Ogedegbe, 2012). See Table 3.

Interventions

Patient-based Interventions

The most common approaches to improving blood pressure control at the patient level regardless of race is patient education to address misconceptions about hypertension and to improve adherence to drug therapy (Odedosu et al., 2012). In trying to overcome patient-related barriers, emphasis should be on patient education, in particular addressing misconceptions about hypertension and promoting adherence to antihypertensive therapy. According to Odedosu et al., (2012), patient education can improve blood pressure and its aims are to increase patients’ understanding of the disease and to encourage them to be more active in their own care.

Computer interventions have emerged as an effective approach to increasing health knowledge, health-related skills, and health outcomes (Odedosu et al., 2012). Migneault et al., (2012) evaluated a culturally adapted, automated telephone system to help hypertensive, urban African–American adults improve their adherence to their antihypertensive medication regimen and to evidence-based guidelines for dietary behavior and physical activity. The totally
automated, computer-based, interactive telephone counseling system, called Telephone-Linked-Care, monitored, educated, and counseled African–American adults with hypertension and provided summary data regularly to the patient’s primary care provider (Migneault et al., 2012). The automated service was associated with improvements in overall diet quality and energy expenditure. A decrease in systolic BP between groups was not statistically significant (−2.3 mmHg, p = 0.25). Although the treatment group’s adjusted 7-item Morisky Medication Adherence Scale scores improved by 0.19 points relative to controls, this change was not statistically significant (p = 0.25) (Migneault et al., 2012).

Motivational interviewing is a promising patient-centered approach for improving adherence in patients with chronic disease. Motivational interviewing is defined as a directive, patient-centered approach to counseling designed to motivate people for change by helping them to recognize and resolve the discrepancy between their present behavior, and their future personal goals and values (Obedegbe, Chaplin, Schoenthaler, et al., 2008). Motivational interviewing is composed of principles and techniques drawn from various theoretical paradigms, the most important of which are its patient-centeredness, its ability to enhance patient's self-efficacy, and its focus on patients' readiness to change behavior. Ogedegbe et al., (2008) randomized 190 hypertensive African American patients to receive usual care or quarterly counseling sessions that used motivational interviewing focused on medication adherence. The counseled patients stayed adherent to their medications, whereas adherence declined significantly in those receiving usual care. This effect was associated with a modest, non-significant trend toward a net reduction in systolic blood pressure with motivational interviewing. See Table 4.
Nurse-based Interventions

Bosworth, Olsen, Grubber, et al., (2009) study of a practice in which almost half the patients were African American, randomized patients to receive usual care, nurse-administered tailored behavioral telephone counseling, home blood pressure monitoring, or home monitoring plus tailored behavioral telephone counseling. Bosworth et al., (2009) found that a combination of home monitoring and tailored behavioral telephone counseling led to a statistically significant improvement in blood pressure control at 24 months compared with baseline. Artinian et al., (2001) evaluated the effect of nurse-managed telemonitoring on blood pressure control vs. enhanced usual care. The monitored group had a significantly greater reduction in systolic pressure at 12 months compared with those who received enhanced usual care. See Table 5.

Pharmacy-based Interventions

Pharmaceutical interventions have been shown to improve the BP control in hypertensive patients by increasing the appropriateness of prescribing and adherence to treatment. Ramanath, Nagakishore, & Kumar, (2012) study showed that clinical pharmacist intervention among a rural population has a very strong positive impact in creating awareness about the disease, and its maintenance by increasing their medication adherence. Hunt, Siemienczuk, Pape, et al., (2008) conducted a randomized controlled trial in which pharmacists actively participated in the management of blood pressure. The pharmacists reviewed medications and adverse drug reactions, assessed lifestyle behaviors and barriers to adherence, made dosing adjustments, and added medications. Patients randomized to the intervention group achieved significantly lower systolic and diastolic pressures (137/75 vs. 143/78 mm Hg in the control group). However, information about race was not included. See Table 6.
Conclusion

The purpose of this paper was to determine the factors associated with medication adherence in hypertensive African Americans and successful interventions. Barriers associated with non-adherence included patient, physician, and therapy related barriers. Medication adherence is primarily in the domain of the patient. Because patients recall as little as 50% of what is discussed during the typical medical encounter, effective patient education must be multifactorial, individualized, and delivered in a variety of methods and settings outside of the examining room (WHO, 2003). A key component of any adherence-improving plan is patient education.

The substantially improved adherence of patients who report a good relationship with their physician highlights the important role of physicians in the medication adherence equation. Similar to any relationship, one key to a good physician-patient relationship is effective communication. Thus, perhaps the foremost strategy providers can use to increase medication adherence is to follow a patient-centered approach to care that promotes active patient involvement in the chronic disease management decision-making process.

Addressing therapy-related factors should contribute positively in improving patient compliance. Prescribing medication with non-invasive route of administration (eg, oral medication) and simple dosing regimens might motivate patients to be compliant. Long duration of treatment period and medication side effects might compromise patient’s beliefs about medication effectiveness (Jin, Sklar, On, & Li, 2008). Therefore, healthcare providers should consider therapy-related problems when designing the therapy plan and involve the patients in the process to minimize the possible therapeutic barriers.
Although there is a growing body of literature on interventions to reduce disparities in hypertension and blood pressure control between African Americans and Caucasians, gaps in the literature still exist. Only a few randomized controlled trials have focused on African Americans. The majority of articles used in this review are not considered recent (within past 5 years), and this may be related to a number of factors. First, there may be a professional disinterest in hypertension in the African American community. Hypertension in this population has been an ongoing problem for decades and researchers may have turned their attention to other pressing issues that are affecting the population as a whole. Secondly, because changing ones behavior is challenging, researchers may be reluctant to tackle such a recalcitrant task. However, the work must continue in order to positively impact the health of hypertensive African Americans. While interventions for improving medication adherence have successfully enhanced adherence in the short-term, the findings for longer-term chronic disease medication are discouraging. Furthermore, the majority of interventions designed to improve adherence have been conducted in urban settings, and thus, little is known of their effectiveness in rural areas. More research is needed to better understand the optimal combination of interventions and user characteristics to improve medication adherence among hypertensive African Americans in a rural setting.
Reference


Table 1: Patient-related barriers to medication adherence

<table>
<thead>
<tr>
<th>Author and Journal</th>
<th>Sample</th>
<th>Methods</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-Mehza, A, Al-Muhailije, F. (2009). <em>European Journal of General Medicine</em> 6(1), 6-10</td>
<td>There were 154 hypertensive patients from a hypertension clinic in Kuwait were followed for 6 months</td>
<td>Three BP measures were in an interval of at least 4 weeks after being on meds for at least 3 months. Participants were labeled un-controlled hypertensive if the mean of the three measures of SBP ≥140mmHG and/or DBP was ≥90mmHG. Self-report and pill count measured participant’s non-compliance. Subjects who had consumed less than 80% of the prescribed drugs were labeled as being non-compliant.</td>
<td>Non-compliance was a significant predictor for uncontrolled hypertension. Knowledge and awareness of HTN was significantly associated with compliance. More than half of the non-compliant patients reported forgetfulness and absence of symptoms of HTN as reasons for their non-compliance.</td>
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<tr>
<td>Courtenay, W., McCreary, R. &amp; Merighi, J. (2002). <em>Journal of Health Psychology</em>, 7(3), 219-231</td>
<td>A convenience sample of 1816 undergraduate students, ranging in age from 18 to 72 years (M = 22 years, SD = 6 years), was recruited from three four-year, English-language, California public universities. The sample was comprised of 60 percent women. Thirty-seven percent of the sample was Asian American, 28 percent European American, 18</td>
<td>To assess health risk behaviors, a series of seven behavioral and three attitudinal/belief domains were identified. A list of behaviors or beliefs was then generated for each domain. A total of 48 items were produced in all. The seven behavioral domains were: diet, exercise and fitness, substance use, preventive care, social support, safety,</td>
<td>Men were more likely than women to engage in behaviors and adopt beliefs that were detrimental to their health. A secondary finding was that many of the health risk behaviors examined were intercorrelated. For example, Diet was positively correlated with Anger and Stress, Preventive Care, Medical Compliance and Substance Use; the Anger and Stress domain was also correlated with both Preventive Care and Substance Use.</td>
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<td>Ferdinand, K.</td>
<td>2009</td>
<td>Cardiology Review</td>
<td>26(1), 17-19</td>
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<td>Gascon, J., Sanchez-Ortuno, M., Skidmore, L., &amp; Saturno, J.</td>
<td>2001</td>
<td>Family Practice</td>
<td>21(2), 125-130</td>
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<td>Krousel-Wood, M., Muntner P, Joyce, C. et al.</td>
<td>2010</td>
<td>Journal of American Geriatrics Society</td>
<td>(58)1, 54-61</td>
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</table>
pressure control and antihypertensive medication adherence were collected in a telephone survey between August 2006 and September 2007. Low medication adherence was defined as a score less than 6 using the eight-item Morisky Medication Adherence Scale.

| Lague,T., Weiner, M., Eachus, S., Tang, S., Schwartz, J., & Turner, B. (2009). *American Journal of Managed Care*, 15(1), 24-30 | 327 African Americans aged > or = 18 years | Cross-sectional study of patients enrolled in a Medicaid managed care plan and treated in 6 primary care practices. Prescription filling was defined as a match between a new or renewed electronic prescription and an insurance claim within the 30 days. The study assessed the association of comorbidity type with filling an antihypertensive prescription by using an adjusted logistic regression model that accounted for clustering of prescriptions within patients. | 1. Age 50 years or younger was associated with lower adherence.  
2. Having 5 or more non-cardiovascular comorbidities was associated with higher adherence.  
3. Cardiovascular comorbidities were not associated with adherence.  
4. Having stage 2 hypertension was significantly associated with higher adherence. |

<p>| Lukoscheck,P. (2003). <em>Journal of Health Care for Hypertensive Africa</em> Americans were recruited | A qualitative study to explore hypertensive African | Themes identified that adherence may be influenced by: 1. Adaptation and |</p>
<table>
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<tr>
<th>Study</th>
<th>Participants</th>
<th>Methods</th>
<th>Findings</th>
<th>Implications</th>
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<tr>
<td>the Poor and Underserved, 14(4), 566-587.</td>
<td>from an urban, public hospital and divided into two categories: adherent, well-controlled versus non-adherent, poorly controlled participants</td>
<td>Americans beliefs and attitudes regarding hypertension that might serve as barriers to hypertension.</td>
<td>preservation of health beliefs, 2. Absence of disease symptoms. 3. Distrust, stress, and perception of racial prejudice, and 4. Patient-provider relationship.</td>
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<td>Patel, K., &amp; Taylor, S. (2002). Annals of Pharmacotherapy, 36(1), 40-45</td>
<td>Patients were recruited from the University of Michigan hypertensive clinic. Inclusion: 1. &gt;18 years 2. Regular attendance at the clinic 3. Diagnosis of hypertension within 1 year prior to completing the study, and 4. A goal to reduce hypertension. There were 102 participants with 46 males and 56 females.</td>
<td>A prospective, cross sectional survey of hypertensive patients assessed patients’ health beliefs, illness attributions, and perceived control. Six months later a follow-up telephone survey determined medication adherence.</td>
<td>Patients indicated that modifiable variables were the most common attribution believed to cause hypertension; however, there was no significant relationship to medication adherence.</td>
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<td>Shea, S., Misera, D., Ehrlich, M., Field, L., &amp; Francis, C. (2002). American Journal of Public Health, 82(12), 1607-1612.</td>
<td>Subjects (n = 202) were interviewed as part of a case-control study of severe, uncontrolled hypertension conducted in two New York City hospitals. All subjects were African American or Hispanic.</td>
<td>Self-reported non-adherence to drug treatment for hypertension was measured using a five-item scale, and the sample was dichotomized as more (n = 87) or less (n = 115) adherent. Multiple logistic regression analysis was used to adjust for demographic and other covariates.</td>
<td>Changing the locus of care for hypertension from emergency rooms to primary care physicians may improve adherence to hypertension treatment in minority populations.</td>
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<td>Turner B., Hollenbeak, C., Weiner, M., Ten Have T., &amp; Roberts, C.(2009), Pharmacoepidemiology &amp;</td>
<td>300 hypertensive patients aged &gt;70 from four urban primary care practices.</td>
<td>Participant’s annual mean systolic blood pressure was calculated from electronic records. Subjects were asked Self-reported adherence was associated with a higher blood pressure, especially in elderly black patients. To promote adherence data suggest</td>
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<td>Drug Safety, (18) 8, 672-681</td>
<td>about the last missed antihypertensive dose in six time intervals. Based on association with blood pressure control, non-adherence was defined as missing any dose in the past 3 months. Subjects were also asked about six domains of adherence barriers: health, personal support, drug coverage, medication filling and use, doctor–patient interaction and knowledge. All models were adjusted for demographics, treatment regimen, and sampling weights.</td>
<td>targeting the filling of prescriptions, prioritizing hypertension care and educating about effects of hypertension.</td>
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<tr>
<td>Author &amp; Journal</td>
<td>Sample</td>
<td>Methods</td>
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<td>Fongwa, M., Evangelisa, L., Hays, R., (2008). <em>Vascular Health and Risk Management</em> 4(1), 157-166</td>
<td>African American women receiving treatment for the disease from an ambulatory inner-city free clinic in West Los Angeles. Five focus group interviews were conducted with 20 hypertensive African American women, 35 years and older.</td>
<td>Qualitative study in which transcripts from the tapes were analyzed for content describing adherence to treatment factors.</td>
<td>Factors associated with adherence to treatment included beliefs about hypertension, facilitators of adherence to treatment, and barriers to adherence to treatment. Recommendations included need for culturally sensitive education on managing hypertension and medication side effects, early screening for depression.</td>
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<tr>
<td>Gascon, J., Sanchez-Ortuno, M., Skidmore, L., &amp; Saturno, J. <em>Family Practice</em>, 21(2), 125-130</td>
<td>Non-compliant hypertensive patients diagnosed with and receiving treatment for hypertension. Inclusion criteria were anyone ages of 18-80yrs, being treated with anti-hypertensive for &gt;3monts, being non-compliant and having sufficiently good physical and mental health.</td>
<td>A qualitative study with seven focus groups discussions conducted in March-May 2001. Patients were identified as non-compliant, using the Morisky-Green test at two primary health care centers of the Spanish National Health Services.</td>
<td>A complex web of factors influenced non-compliance including fears and negative images of anti-hypertensive drugs also a lack of basic background knowledge about hypertension. The clinical encounter was viewed as unsatisfactory because of length, few explanations given by the physician and low physician-patient interaction.</td>
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<td>Ren, X., Kazis, L., Lee, A., Zhang, H., &amp; Miller, D. (2002) <em>Journal of Clinical Pharmacy and Therapeutics</em>, 27(1), 47-56</td>
<td>Prescription records from patients who were in the Veterans Health Study (VHS). 2425 patients agreed to</td>
<td>Participants completed the Veterans Short-Form Health Survey, plus in person interview. Within a month they</td>
<td>Number of medications was positively associated with compliance. Patient who were more involved in treatment</td>
<td></td>
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<tr>
<td>Schroeder, K., Fahey, T., &amp; Ebram, S. (2004). Archives of Internal Medicine, 164(7), 722-732.</td>
<td>A systematic review of randomized controlled trials. 38 studies testing 58 different interventions and containing data on 15,519 patients. The studies were conducted in 9 countries between 1975 and 2000.</td>
<td>Reducing the number of daily doses appears to be effective in increasing adherence to blood pressure-lowering medication and should be tried as a first-line strategy. Some motivational strategies and complex interventions appear promising.</td>
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Table 3: Provider-related barriers to medication adherence

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<tr>
<th>Author and Journal</th>
<th>Sample</th>
<th>Method</th>
<th>Findings</th>
</tr>
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<tbody>
<tr>
<td>Haskard Zolnierek, K., &amp; DiMatteo, R. (2009). <em>Medical Care</em>. 47(8), 826-834.</td>
<td>Database searched yielded 128 articles which focused on adherence and communication</td>
<td>Meta-analysis of 106 correlational studies and 21 interventional studies evaluating the effects of physician communication training on the outcome of patient adherence.</td>
<td>Physician communication is significantly positively correlated with patient adherence. Training physicians in communication skills resulted in improvements in patient adherence. With training the odds of patient adherence are 1.62 times higher.</td>
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<tr>
<td>Odedosu,T., Schoenthaler, A., Vieira, D., Agyemang, C., &amp; Ogedegbe, G. (2012) <em>Cleveland Clinic Journal of Medicine</em>, 79(1), 46-56</td>
<td>A data search yielded articles focused on barriers to hypertension control in African Americans and interventions used to create success. No number was reported for articles used.</td>
<td>A systematic review focusing on barriers to hypertension in African Americans and interventions used.</td>
<td>Barriers contributing to patient’s non-compliance were patient r/t (lack of knowledge, inability to engage in lifestyle modification, health beliefs, &amp; medication side effects), physician-r/t (non-adherence to treatment guidelines, failure to emphasize lifestyle modifications), health care system r/t (lack of access to care, high cost of medications). Recommendations to overcome these barriers should focus on patient education, self-monitoring with a home blood pressure monitor, behavioral</td>
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<tr>
<td>Study</td>
<td>Participants</td>
<td>Methodology</td>
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<tr>
<td>Piette, J.D. Heisler, M., &amp; Krein, S., &amp; Kerr, E. (2005). <em>Archives of Internal Medicine</em>, 165(15): 1749-1755.</td>
<td>912 patients with diabetes recruited from 5 Veterans Affairs health systems.</td>
<td>A detailed cross-sectional survey where patients reported their level of physician trust. Results were stratified into high-trust (n = 557) and low trust (n = 355).</td>
<td>A trusting physician relationship may moderate the impact of cost pressures on patients' medication adherence. Addressing non-cost barriers to adherence may reduce rates of cost-related medication underuse.</td>
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Table 4: Patient-Related Interventions

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<th>Author and Journal</th>
<th>Sample</th>
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<td>Odedosu, T., Schoenthaler, A., Vieira, D., Agyemang, C., &amp; Ogedegbe, G. (2012) <em>Cleveland Clinic Journal of Medicine</em>, 79(1), 46-56</td>
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<td>A systematic review focused on barriers to hypertension in African Americans and interventions used.</td>
<td>Barriers that contributed to patient’s non-compliance, were patient r/t (lack of knowledge, inability to engage in lifestyle modification, health beliefs, &amp; medication side effects), physician-r/t (non-adherence to treatment guidelines, failure to emphasize lifestyle modifications), health care system r/t (lack of access to care, high cost of medications). Recommendations to overcome these barriers should focus on patient education, self—monitoring with a home blood pressure monitor, behavioral counseling, and physician-related interventions.</td>
</tr>
<tr>
<td>Obedegbe, G. et al., (2008). <em>American Journal of Hypertension</em>, 21(10), 1137-1143.</td>
<td>190 hypertensive African Americans (88% women; mean age 54 years). Patients were recruited from two community-based primary care practices in New York City.</td>
<td>Randomized controlled trial of a practice-based MINT counseling vs. usual care (UC) on medication adherence and blood pressure (BP). Outcomes were adherence measured by electronic pill monitors; the secondary outcome was within-patient change in office BP from baseline to 12 months.</td>
<td>MINT counseling led to steady maintenance of medication adherence over time, compared to significant decline in adherence for UC patients.</td>
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337 participants from a large, urban safety-net hospital and community health centers. Inclusion criteria were: (a) African–American; (b) diagnosis of hypertension on the active problem list of the patient’s medical chart; (c) current prescription for ≥1 antihypertensive medications; (d) ≥1 primary care office visits in the previous 2 months; (e) two elevated clinic BP readings in the previous 6 months (systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg among non-diabetic patients, and ≥130/80 among diabetic patients); and (f) age ≥35 years.

Randomized 337 patients to an 8-month automated, multi-behavior intervention or to an education-only control. Medication adherence, diet, physical activity, and BP were assessed at baseline and every 4 months for 1 year. Data were analyzed using longitudinal modeling.

Automated telecommunications systems can promote self-management of diet and energy balance in urban African–Amercians.
Table 5: Nurse-Based Interventions

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<th>Author and Journal</th>
<th>Sample</th>
<th>Method</th>
<th>Findings</th>
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<tbody>
<tr>
<td>Artinian, N., Washington, O., &amp; Templin, T. (2001). <em>Heart and Lung</em></td>
<td>26 participants—3 (11.5%) men and 23 (88.5%) women—had a mean age of 59 years, with a range of 32 to 93 years. All participants were African American.</td>
<td>Pilot study with randomized controlled design. Participants were assigned to 3 groups: home tele-monitoring plus usual care; community-based monitoring plus usual care; or usual care only. Stratification by use or nonuse of antihypertension medication was used.</td>
<td>Participants in the home tele-monitoring and community-based monitoring groups had clinically and statistically significant reductions in both SBP and DBP during a 3-month monitoring period compared with the participants in the usual care group.</td>
</tr>
<tr>
<td>Bosworth, H. et al., (2009). <em>Annals of Internal Medicine</em>, 151 (10), 687-w224.</td>
<td>636 Hypertensive patients</td>
<td>Randomized patients received usual care, a behavioral intervention (bimonthly tailored, nurse-administered telephone intervention targeting hypertension-related behaviors), home BP monitoring 3 times weekly, or the behavioral intervention plus home BP monitoring.</td>
<td>Combined home BP monitoring and tailored behavioral telephone intervention improved BP control, systolic BP, and diastolic BP at 24 months relative to usual care.</td>
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### Table 6: Pharmacy-Based Interventions

<table>
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<tr>
<th>Reference</th>
<th>Description</th>
<th>Outcome Measures</th>
<th>Result</th>
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<tr>
<td>Hunt, J. et al., (2008). <em>Journal of General Internal Medicine</em>, 23(12), 1966-1972.</td>
<td>In the Providence Primary Care Research Network of patients with hypertension and uncontrolled blood pressure.</td>
<td>Pharmacy practitioners participated in the active management of hypertension in the primary care office according to established collaborative treatment protocols. Outcome measures were the differences in mean systolic and diastolic blood pressures between arms at study end and blood pressure goal attainment (&lt; 140/90 mmHg), hypertension-related knowledge, medication adherence, home blood pressure monitoring, resource utilization, quality of life, and satisfaction.</td>
<td>Patients achieved significantly better blood pressure control compared to usual care with no difference in quality of life or satisfaction.</td>
</tr>
<tr>
<td>Ramanath, B., Nagakishore, C., &amp; Kumar, M. (2012). <em>Archives of Pharmacy</em></td>
<td>Fifty-six patients were enrolled; only 52 patients completed the study. Race was not specified.</td>
<td>Prospective, randomized interventional study. Interventional group patients received patient counseling, patient information leaflets (PILS), and frequent telephone reminders. Medication adherence and QOL were assessed with the Morisky Medication Adherence Scale</td>
<td>Clinical pharmacist patient counseling had a positive impact on medication adherence and QOL.</td>
</tr>
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(MMAS) and Medication Adherence Report Scale (MARS) Questionnaires and SF-12v2 Quality of life Questionnaire.
Clinical Practice Model: Integrative Model of Behavior Change

Laneita Davis, FNP-BC, DNP-candidate

Belmont University
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One of the most prevalent and serious health issues among African-American patients is hypertension. Though a large percentage of the population has hypertension, many do not follow prescribed treatments or take medication for the condition. Statistics show that individuals of African-American descent are more likely to develop hypertension than any other ethnicity in the United States with about 43 percent of African-American men and 45 percent of African-American women affected by the condition (Center for Disease Control [CDC], 2012). In comparison, a national average of those suffering with this condition is 34 percent of men and 32 percent of women (CDC, 2012). Clearly, African Americans have a higher prevalence of this serious illness. When left untreated, hypertension may result in life-threatening complications including abdominal aortic aneurysm, chronic kidney disease, cardiac arrest, stroke, loss of vision, or peripheral artery disease (CDC, 2012). However, despite the grave potential consequences of leaving hypertension untreated, only seven out of ten Americans with the condition use medication to control their high blood pressure (CDC, 2012). The Integrative Model of Behavioral Prediction uses a reasoned action approach to understand behavior. The model purports that although an infinite number of variables may in some way influence behavior, only a small number of variables need to be considered to predict, change, or reinforce a particular behavior in a particular population (Fishbein & Ajzen, 2010). This paper proposes an intervention based on the Integrative Model of Behavioral Prediction, also known as I-Change model. The I-Change model is a method used in modifying behavior that is easy to implement and effective in changing behavior. The proposed intervention employs the I-Change Model as a framework for persuading patients to take their hypertension medication as prescribed.
Theoretical Framework

The Integrative Model of Behavior Change (I-Change Model) is the most recent formulation of Fishbein and Ajzen’s (2010) reasoned action approach. The development of the reasoned action approach has been sequential. Early work by Martin Fishbein in the 1960s focused on conceptual differences between beliefs, attitude, and intention constructs in response to scholars who doubted the usefulness of the attitude construct for predicting human behavior (Fishbein & Ajzen, 2010). This early work informed the theory of reasoned action, which models beliefs about particular outcomes and referents’ approval regarding the behavior as antecedents, and intentions and behaviors as consequences of attitude (Fishbein & Ajzen, 2010). In the 1980s, Icek Ajzen proposed the theory of planned behavior, which models perceived control over behavioral performance as an additional behavioral determinant next to attitude and subjective norm (Fishbein & Ajzen, 2010).

The work of Fishbein and Ajzen resulted in another formulation of the theory which was proposed in 2000 as the Integrative Model of behavioral prediction (I-Change Model). The newest formulation extends the scope of the normative determinant and point’s attention to skills and environmental barriers as moderators of the intention–behavior relationship (Fishbein & Ajzen, 2010). The I-Change Model assumes that the behavioral change process can be segmented into three phases: 1) Awareness, 2) Motivation, and 3) Behavior. The model describes a linear process toward behavior change. In the awareness phase, the participant becomes aware of their risk behavior. As the individual becomes aware of the personal consequences of their risky behavior, s/he may spend a significant amount of time thinking about the consequences of
the risky behavior. When awareness is created, understanding takes place. This understanding may help to change the individual’s attitude by developing a sense of responsibility for his/her behavior. The sense of responsibility can mature into a motivation to change the risky behavior. Important factors required to proceed through this phase, according to I-Change model, are knowledge, risk perceptions, and cues that prompt awareness (Broekhuizen, Van Poppel, Koppes, Brug, & Mechelen, 2010). In the motivation phase, a person becomes motivated to change his/her risky behavior. Important factors influencing motivation are attitudes, social support and self-efficacy expectations. Proceeding through the motivational phase results in positive intention to change one’s behavior. Intention to perform a behavior is a function of attitudes toward engaging in the behavior and perceived pressures to perform the behavior. In the final phase, motivation and intentions transition to changed behavior. For behavior change and maintenance, an individual attempts to convert his/her more global goal intentions into specific implementation intentions or action plans, with relevant strategies that will enable him/her to attain the desired goal of decreased risk (Broekhuizen et al. 2010). (See Figure 1).

**Literature Support**

In the past, the I-Change model has proven to be effective in dealing with a variety of issues around the world. For example, in a skin cancer study conducted in Belgium, the I-Change model was used to facilitate behavior changes related to the usage of sunscreen lotion among teenagers (De Vries, Mesters, Riet, Willems & Reubsaet, 2006). De Vries and colleagues (2006) reported that the regular usage of sunscreen was found in individuals who became aware of the need to protect themselves from ultraviolet rays. The teens were motivated to be more careful while outdoors, and took the necessary precautions to make certain they were protected by using sunscreen and staying in the shade as much as possible. The I-Change Model was helpful in
explaining the motivations and intentions of the individuals who were using sunscreen lotion in determining behavior change. This study’s results were beneficial in the development of programs that focused on skin cancer prevention and sunscreen promotion.

Another example of the I-Change Model use is described in the 2005 study of De Vries and colleagues. The I-Change Model was used to analyze the general public’s need and perceptions concerning information on the role of hereditary factors on cancer development. The results from the study in 457 Dutch adults showed that 25% correctly indicated the types of cancer in which hereditary factors played a role (De Vries, Mesters, Steeg, & Honing, 2005). Using the I-Change Model was beneficial in determining the misconceptions regarding the importance of genetics and its influence on certain types of cancers. De Vries and colleagues (2005) analyzed levels of knowledge and interest regarding genetic information on hereditary cancer. Based on the analysis, the group recommended a program to increase awareness and recognition of potential hereditary predisposition in individuals. The study also found that carefully planned information activities were needed to increase general knowledge about cancer and cancer symptoms, and to establish correct perceptions of the types of cancer that have hereditary components and personal risks.

The behavior change components of the I-Change model were a significant part of the process of abusive alcohol consumption when studied by a Dutch survey of frequent drinkers (Schulz, Kremers, & DeVries, 2012). The study found that for an individual who is attempting to discontinue drinking or consume less alcohol, the first and most important factor to consider was a change in his/her attitude towards drinking. Once the individual was made aware of his/her risky behavior and the consequences, the individual became motivated to change the risky
behavior. The support of the people around him/her is a strong and positive factor in moving to the final step of behavior change. The final step of behavior change occurred when the drinker was motivated to the point of action, at which point the individual reported some form of success in achieving his/her goal (Schulz, Kremers, & DeVries, 2012).

The advantages of using this model are quite easy to see. The I-Change model can be used to correct almost any behavior in an individual with need. It is applicable to modifying behaviors related to smoking cessation, weight loss, or medication adherence. This model, unlike many others, can cross over socioeconomic, geographic or ethical barriers with ease. The only requirement is that an individual have a behavior s/he wants to change or modify. The individual’s background, occupation or home situation is irrelevant because the I-Change model is rooted in universal human nature. The only limitation to the I-Change model is an individual’s willingness and determination to change. Because an individual’s awareness or motivation is variable, some individuals may stall in a particular stage without progressing to the next stage in the I-Change Model.

**Gaps**

The I-Change model is versatile in its usage and easy to implement in most settings, including healthcare environments such as inpatient settings, outpatient clinics, community based settings, or home healthcare visits. The model is viable when used in a large hospital as well as in a free clinic that provides care to working class people without insurance. Since the I-Change model is simple, straightforward and easy-to-comprehend, it can be used in any facility, any city, and any country in the world with high success. Although the I-Change model has been used in a variety of settings, its use has not been publicized in African Americans or rural settings.
The quality and amount of healthcare that minority Americans receive is less than the recommendations. Minorities are less likely to receive preventative healthcare, are more likely to develop conditions such as heart disease or diabetes, and are less likely to have a healthcare provider who is familiar with their situation and whom they visit on a regular basis for check-ups (Graham, 2011). These minority individuals are less likely to receive health-screenings or to have easily available and affordable healthcare. Among African-Americans, for example, close to half of the population has hypertension (CDC, 2012). A large number of African Americans do not have access to regular healthcare and, therefore, may believe that medicine or visits to a healthcare provider are unimportant until severe complications develop (Artinian, Washington, & Templin, 2001). Educating African Americans about the risks of high blood pressure and teaching them how to monitor their blood pressure at home will result in more people realizing that high blood pressure is a serious, important health factor that should not be overlooked.

According to the I-Change Model, being aware of a risky behavior could move an individual toward motivation to attend to the serious condition of hypertension. This motivation could make more patients attempt to adhere to their blood pressure medication regimen as a behavior change. The I-Change Model is a framework that could influence African Americans to take greater care to lower their blood pressure. Using the I-Change model would be easy and efficient and have a positive impact on the health and well-being of African-Americans and other minority groups. The Integrated Theory of Health Behavior Change suggests that health behavior change can be enhanced by fostering knowledge and beliefs, increasing self-regulation skills and abilities, and enhancing motivation.
Application

In the case of implementing the I-Change model to treat hypertension among African-American patients, there are no modifications that need to be made in the basic model. The intervention is done in three parts: awareness, motivation and behavior. In the awareness step of this project, the patients would receive instruction on the health risks of untreated hypertension and the potential complications. The patients would also be taught how to easily monitor his/her blood pressure at home. By performing home blood pressure monitoring, an individual would have an increased awareness by increasing his/her risk perception with visual cues to trigger a need for behavior change. The motivation step of the project would involve the individual applying the new knowledge, performing home blood pressure monitoring, and keeping a record of his/her blood pressure results. Seeing his/her blood pressure results and knowing the potential outcome of leaving high blood pressure untreated are cues about the individual’s risk. Hopefully, this knowledge would lead the individual to transition to the third stage of the I-Change model’s process, which is behavior. It is in this final step that the patient applies his/her motivation and is spurred into action for behavior change. The individual engages actively to do his/her best to lower his/her blood pressure by adhering to the prescribed medical regimen. The determination to change their behavior is built on the model’s components of awareness and motivation. The intervention will have run its course when the patient engages in behavior that is compliant with his/her prescribed medical regimen.

The biggest barrier to achieving the desired behavior is the chance that the patient becomes stalled at one stage of the process before the behavior change occurs. This stall risk is most likely to occur in the beginning of the process, when the patient may not have enough interest or social support to move on to the second stage. In the motivational stage, the patient
might experience waning motivation, which could delay progress to the final behavior change. If a person is not ready to change, then the change will not occur. People develop motivation and readiness at different rates; some will need time before they are ready to actively make a change in their behavior.

Healthcare providers need to be aware that the I-Change model is a three-stage process. A patient must proceed from one stage to the next in a predetermined order before s/he can succeed in changed behavior. Motivation cannot come before awareness, since it is difficult to become motivated to change something if one is not aware it is an issue. It must be noted that the patient is likely to move back and forth between the stages based on his/her emotional outlook at any given point in time. The patient’s determination and desire to make a change are of great importance in achieving success. Therefore, it is entirely likely that a patient may move between stage one and two or two and three several times before a permanent behavior change takes place. Healthcare providers should recognize this movement between stages as commonplace.

**Conclusion**

Though non-adherence to hypertension treatment is a serious problem with African-American patients, the I-Change model of intervention would be an efficient model to help patients to comply with their prescribed medical regimen. Through education about their condition, potential complications that could arise due to non-compliance with prescribed treatments, and information on how to monitor their blood pressure at home, the patient will be motivated to make a behavior change. Because the I-Change model is effective, simple to follow, and adaptable to any environment, it is an ideal model choice in behavior modification. The I-Change model can help many patients change their health behavior. Implementing this model would create a positive change in African Americans with hypertension in a rural setting.
Engagement in healthy behavior is essential to improvement of health and management of chronic conditions. Nurses and other healthcare providers benefit from knowing how to support the initiation and maintenance of health behavior change by individuals. The I-Change model presented is an integration of past successes and makes substantive contributions to understanding health behavior change by combining knowledge and beliefs, and self-regulation processes. It is purported that the behavior changes necessary to manage chronic conditions are more similar than different than behavior changes necessary for health promotion. Measurement of behavior change occurs proximally to ensure that behavior change has actually occurred, as well as distally to ensure attainment of improved health status.
Reference


The Effectiveness of Home Blood Pressure Monitoring on Medication Adherence in African Americans in a Rural Setting

Laneita Davis, FNP-BC, DNP-candidate

Belmont University
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High blood pressure is a major risk factor for heart disease and stroke, both of which are leading causes of death in the United States. Nearly one-third of all American adults have high blood pressure and more than half of those affected do not have well-controlled hypertension (Center for Disease Control [CDC], 2013). Hypertension is 30%–50% more prevalent in African Americans than Caucasians and accounts for half of the excess cardiovascular mortality observed in African Americans (Bravermen & Dieder, 2009). Of those diagnosed with hypertension, African Americans have lower rates of blood pressure (BP) control than other ethnicities, and this disparity has increased over time (Bravermen & Dieder, 2009). Poor medication adherence to prescribed antihypertensive medications contributes significantly to lower BP control and increasing such adherence is considered to have the greatest potential to improve BP control (CDC, 2013). According to a 2003 report by the World Health Organization, approximately 50% of patients do not adhere to their medications as prescribed (Brown & Bussell, 2011). Adherence is a key factor associated with the effectiveness of all pharmacological therapies but is particularly critical for medications prescribed for chronic conditions. Of all medication-related hospitalizations that occur in the United States, between one-third and two-thirds of the admissions are the result of poor medication adherence (CDC, 2013). Home blood pressure monitoring is one strategy that can be implemented in the African American community to improve medication adherence in an effort to reduce morbidity and mortality related to hypertension. Home blood pressure monitoring is defined as the regular measurement of blood pressure by the patient outside the clinical setting, either at home or elsewhere (Bravermen & Dieder, 2009). The purpose of this project, is to evaluate the effectiveness of home blood pressure monitoring on medication adherence and blood pressure control in African Americans.
Theoretical Framework

The theoretical framework for this project is based on the I-Change model. The I-Change model is loosely founded on the Attitude-Social Influence-Self efficacy (ASE) model (Broekhuizen, van Poppel, Koppes, Brug & Mechelen, 2010). The I-Change model consists of three components; Awareness, Motivation, and Action. In the initial Awareness step, the patient is made aware not only of the risk of unmanaged hypertension [HTN], but also of the need for changing his/her behavior. In this scholarly project, the initial step was accomplished by sharing information with the patient about the risks involved in ignoring their hypertension, as well as the benefits of improved HTN control. Because patients recall as little as 50% of what is discussed during the typical medical encounter, effective patient education must be multifactorial, and individualized (Brown & Bussell, 2011). A key component of any adherence-improving plan is patient education. This knowledge could provide awareness for his/her need of a change. Following the Awareness step of the I-Change model is Motivation. In the Motivation step, an individual became motivated to improve his/her health habits. In this scholarly project, Motivation was accomplished through teaching the patients to self-monitor their blood pressure at home. When an individual saw the actual blood pressure numbers and related the BP values to information related to HTN risks, she/he was motivated to change their current habits in order to reduce risks and improve benefits. Proceeding through the motivational step of the I-Change model resulted in the patient developing positive intentions to change his/her current behavior. The final step of the I-Change process after Awareness and Motivation is the Action step. In the Action step of the scholarly project, the patient followed the natural course of Awareness and Motivation and took Action to improve his/her medication adherence to reduce risk and improve benefit of managed HTN. In this project, the patient took action by following his/her prescribed
medication regimen. In order to create Motivation, individuals were taught how to use a home blood pressure monitor. The individual was motivated by seeing and recording his/her daily blood pressure values. Seeing his/her blood pressure values combined with Awareness of the risks of uncontrolled HTN and the benefits of managed HTN, facilitated the individual Action of taking antihypertensive medications as prescribed.

**Design**

This project was a feasibility pilot study, which used a randomized control design. Participants were randomly assigned to one of two groups. Group A, received the intervention of home-monitoring plus education, and Group B, received usual care (clinic monitoring). Randomization assignments were determined before the start of data collection by using an online randomization tool. Approval by the Belmont University Institutional Review Board was obtained prior to implementation of the study.

**Setting/Sample**

This scholarly project was conducted in Tunica County Mississippi at the Preventative Health Clinic, one of two clinics serving the area. Preventive Health Clinic provides health services to more than 1000 adults and children, 90% of whom are African American. Approximately 50% of the clinic’s patients have HTN and are prescribed medications to control and manage the chronic disease. The majority of Tunica County residents are African American (76%) and many are below the poverty level according to the most recent US Census information (2013). The Tunica County residents reflect the state of health in Mississippi in which not only more than 700,000 adults have HTN, but also in which cardiovascular disease is the highest in the nation.
Recruitment

Recruitment for potential participants was conducted between June 1, 2013 and September 30, 2013. Recruitment posters were posted throughout Tunica County at businesses (Exxon gas station, Piggly Wiggly grocery store, and the Fred’s convenience store), flyers were placed in church bulletins (the Macedonia, St. Luke, Belmont, and Love Temple Baptist churches) and advertisements were published in the local newspaper (Tunica Times). Inclusion criteria for participants were: 1) African American patients diagnosed with hypertension and prescribed anti-hypertensive medication, 2) >18 years of age, 3) English speaking, and 4) non-adherent to their medications as evidenced by self-report and by the Morisky 8-Item Medication Adherence Questionnaire. Exclusion criteria: 1) physical, mental and health restrictions, 2) unable to duplicate self-monitoring demonstration, 3) less than 18 years of age, and 4) participants not meeting inclusion criteria. Participants were asked to contact the investigator via telephone or email if interested in participating in the study.

During the recruitment phase, potential participants contacted the principal investigator (PI) via email or phone if he/she was interested in the study. During the initial phone call, a mutually agreeable upon date and time was set to meet with the participant at Preventative Care Health Services clinic. The potential participant completed the Morisky 8-Item Medication Adherence Questionnaire and a demographic survey. If the participant scored greater than a 2 on the Morisky Questionnaire, and met all other inclusion criteria, this person was eligible to participate in this project. After determining eligibility, the principal investigator obtained an informed consent and baseline blood pressure readings.
Data Collection

Eligible participants were randomized into two groups; the home blood pressure monitoring group (intervention group n=10) or the usual care group (clinic monitoring n=10). An online randomization tool was utilized to determine group orientation. At the first meeting, participants in the intervention group were given a brief overview of hypertension, which included: signs and symptoms, the staging of hypertension based on the JNC-VII guidelines, and the meaning of systolic and diastolic blood pressure values. All provided education materials were located in the manufacture’s home BP monitor instruction manual. After the education session was completed, the principal investigator measured the participant’s arm and selected the appropriate blood pressure cuff. The participants were instructed on the proper technique of taking an accurate blood pressure and given an education pamphlet to reinforce learning (See Appendix A). To validate understanding, each participant performed a return demonstration. The blood pressure machine used for this project was the Omron 7 series model BP760. To ensure reliability, the machine was validated and approved by the Association for the Advancement of Medical Instrumentation, the British Hypertension Society and the International Protocol for the Validation of Automated BP Measuring Devices. The principal investigator calibrated the blood pressure machine. The participants were asked to take his/her blood pressure twice a day, one reading in the morning and one in the evening for 12 weeks, and record his/her readings in the provided journals. The usual care group had their blood pressure taken during the study time according to the recommendations of his/her PCP. At the end of the 12-week period, the usual care and the intervention group participants returned to the clinic to complete the post-intervention Morisky questionnaire, and have their blood pressure taken and recorded by the principal investigator. The primary project objective was to demonstrate increased medication
adherence after 12 weeks of home self-monitoring blood pressure with a decreased Morisky score. The secondary project objective was to have an improvement in blood pressure values as evidenced by a drop in systolic and diastolic blood pressure values after 12 weeks.

**Data Analysis**

Data analysis procedures were conducted by using SPSS statistical software. Descriptive statistics were used to analyze all study variables. Fisher’s exact was used to measure medication adherence and blood pressure control between groups. Blood pressure was analyzed as the dichotomous variable (“uncontrolled” or “controlled”) according to the JNC-VII national guidelines (Chobanian, Bakris, Black, Cushman, Green, Izzo, et. al., 2008). Specifically, among non-diabetic participants systolic blood pressure (SBP) values ≥140 mmHg and diastolic blood pressure (DBP) values ≥90 mmHg were considered “high”. The corresponding BP cut-off for diabetic participants was 130/80 mmHg.

Self-reported medication adherence was measured with the eight-item Morisky Medication Adherence Scale (MMAS) (Morisky, Krousel-Wood, & Ward, 2008). This adherence measure was designed to facilitate the identification of barriers to and behaviors associated with adequate adherence to chronic medications. In previous studies, the scale has been reliable ($\alpha=0.83$) and associated with significant blood pressure control ($p<0.05$) in low income, mostly minority and underserved individuals with hypertension. Also, the MMAS has demonstrated high concordance with antihypertensive medication pharmacy fill rates. MMAS scores range from 0 to 8 with low adherence defined as $>2$; medium adherence as 1 to 2, and high adherence as 0 (Morisky, Krousel-Wood, & Ward, 2008). For this scholarly project, the MMAS score was summed and dichotomized into 2 categories. Non-adherence was any score greater than two, and adherence was any score less than or equal to two. (see Appendix B).
Results

Of 20 patients included in the study, 45% were between the ages of 31-40, 60% were women, 40% had graduated from high school, and the mean number of antihypertensive medications being taken was 1.5 (range, 1-4 medications). Complete demographic characteristics of the study participants are listed in Table 1. The mean (SD) MMAS score was 7.4 (0.9). A chi-square 2x2 was performed to find a significant difference between those in the intervention group and increased medication adherence. However, since the predicted cell size for two of the cells was 4, the chi-square test was not appropriate to calculate the p value. Because the predicted cell size was less than 5, the Fisher’s exact test was appropriate to calculate the p-value (See Table 5). The Fisher’s exact test found a significant difference for medication adherence between the home monitoring group and the usual care group, p<.05. Seventy percent of patients in the home monitoring group had an improved medication adherence score compared to only 10% in the control group post intervention. After blood pressure was dichotomized, a chi-square test was used to determine whether there was a significant difference in blood pressure control between participants who performed home blood pressure monitoring and those who did not. There was not a significant difference found between the intervention group and control group with p >.05.

Discussion

The purpose of this project was to test the effectiveness of home blood pressure monitoring on medication adherence and blood pressure control in African Americans with HTN. Despite the small sample size, results indicate that the participants in the intervention group had a statistically significant difference in their medication adherence scores after the
intervention than those in the control group. Although there was a lower reduction in both systolic and diastolic blood pressures in the intervention group compared to the control group, these results were not statistically significant (figure 1 & 2). Participants in both groups had blood pressures values that were normal post intervention. This result may have been related to the participants in the control group using other methods for improving BP such as exercise or other lifestyle modifications. Of the twenty participants, only three had an uncontrolled blood pressure post intervention, two were in the control group and one in the intervention group. This result may have been related to the anxiety of being in the study.

These are important pilot results, which, if replicated in a larger sample, could significantly improve care and health outcomes for African Americans with hypertension in a rural setting. Home blood pressure monitoring allows the patient to gain an increased interest in the management of their hypertension and to provide the patient with self-confidence and feelings of reassurance. The tangible blood pressure readings from home blood pressure monitors turned this largely asymptomatic disease into a condition that is measurable in the patients' own homes. Seeing and recording the blood pressure readings could be the patient’s motivation facilitating the Action of adhering to his/her prescribed medication regimen. Although there may be advantages to home BP monitoring, more research is needed to determine the effects of this strategy on long-term control of hypertension.

**Limitations**

Some of the limitations of this study include external validity, or the generalizability of the study. There were only 20 participants who participated in the complete study, and all but one of the participants were high school graduate or beyond. In addition, the participants were all middle to upper middle class adults. In future studies, more research is needed to view
medication adherence in individuals with low socioeconomic status. Tunica, MS is a small rural community and the principal investigator is well known. Many of the participants knew the PI, and this could have caused a false positive result related to the participants wanting to perform well because they knew the principal investigator. In this project, the PI purchased individual blood pressure cuffs. Some individuals that are at or below poverty level may not have the additional funds to purchase a personal blood pressure monitor therefore, future studies are needed on the effectiveness of public kiosk monitoring on medication adherence and blood pressure control. There was a small amount of education performed at the beginning of the project based on information from the pamphlet in the blood pressure machine. This may have not been enough information to create awareness to promote a true behavior change that could be sustained. In future studies, additional educational information is needed in the form of a video or handouts to ensure that the participants understand the information. In addition to this added education, more qualitative information is needed on the participants feelings and their response to home blood pressure monitoring and medication adherence.

**Implication for Nurses**

Nurses play a pivotal role in helping patients to adhere to their medication and increasing blood pressure control. Nursing leadership is important in helping the community understand the importance of taking control of their health. One strategy is through self blood pressure monitoring. For this study, blood pressure monitors were purchased for the participants use, but consideration must be given to individuals who can not afford to purchase a home blood pressure monitor. Self-service kiosks are designed to help consumers monitor and improve their actual health. These health-related kiosks allow users to conveniently monitor their condition, set personal health goals, and measure and track their results. In most cities throughout the United
States, kiosks are usually located at the local grocery stores or pharmacy and can be used at the customer’s convenience. In the small town of Tunica, MS., there are currently no blood pressure kiosks located in any of the grocery stores or pharmacies. Since Tunica has only two health clinics that service about 8,000-10,000 people, scheduling an appointment is often difficult.

Although the prices of the blood pressure kiosks are expensive, research has shown that the long-term benefits of a public kiosk are beneficial. Atkins (1996) found that public kiosks had a profound effect on pharmacy revenue. Stores that had a blood pressure kiosk increased pharmacy revenue by more than fifty percent. Atkins (1996) also found that grocery stores with a kiosk had increased sales and revenue. Research shows that consumers enjoy the convenience of self-service and are more likely to do business with companies that offer the convenient service.

A cost-effective study performed by the principal investigator examined the cost of clinic monitoring versus kiosk monitoring and found that the total cost would be $16.44/person at the clinic and $.40/person at the kiosk (See figure 3).

It was important to advocate and share with key stakeholders the importance of purchasing a blood pressure kiosk for the people of Tunica, MS. The PI had a meeting scheduled with Rev. McKinnely Daley, a representative on the Tunica County Board of Supervisors to discuss obtaining a public blood pressure kiosk for the residents of Tunica, MS. Before the scheduled meeting, a vandalism event occurred at the local high school incurring more than one hundred thousand dollars in damages. In Tunica County, this was not only a significant expenditure, but also a major disruption in the community. Therefore, the meeting between the PI and the County Supervisor was postponed, and is currently pending. Nurses should seek opportunities to advocate for the patient and the community. Advocacy and
leadership are appropriate roles for nurses that can positively impact individuals’ and communities’ health. Nurses can assess communities’ needs and find cost effective solutions similar to the described home blood pressure monitoring project.
References


### Table 1
Characteristics of Participants
(n=20)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>9(45)</td>
</tr>
<tr>
<td>41-50</td>
<td>6(30)</td>
</tr>
<tr>
<td>Over 51</td>
<td>5(25)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>12(60)</td>
</tr>
<tr>
<td>Male</td>
<td>8(40)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Completed HS</td>
<td>8(40)</td>
</tr>
<tr>
<td>Some College</td>
<td>4(20)</td>
</tr>
<tr>
<td>College</td>
<td>7(35)</td>
</tr>
<tr>
<td>Graduate</td>
<td>1(5)</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
</tr>
<tr>
<td>Fulltime</td>
<td>18(90)</td>
</tr>
<tr>
<td>Part-time</td>
<td>1(5)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>1(5)</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;$200/week</td>
<td>1(5)</td>
</tr>
<tr>
<td>$200-$499/week</td>
<td>6(30)</td>
</tr>
<tr>
<td>$500-$799/week</td>
<td>7(35)</td>
</tr>
<tr>
<td>$800-$1000/week</td>
<td>5(25)</td>
</tr>
<tr>
<td>&gt;$1000/week</td>
<td>1(5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean (S.D.)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Meds</td>
<td>1.5 (.76)</td>
<td>1-4</td>
</tr>
<tr>
<td>Years with HTN</td>
<td>2.4 (.99)</td>
<td>1-4</td>
</tr>
</tbody>
</table>
Table 3: Pre/Post BP Values

<table>
<thead>
<tr>
<th>BP Type</th>
<th>Mean (S.D.)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systolic BP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-intervention</td>
<td>139.35 (17.30)</td>
<td>122-200</td>
</tr>
<tr>
<td>Post-intervention</td>
<td>134.25 (10.77)</td>
<td>118-160</td>
</tr>
<tr>
<td><strong>Diastolic BP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-intervention</td>
<td>83.95(15.05)</td>
<td>62-125</td>
</tr>
<tr>
<td>Post-intervention</td>
<td>76.20(6.70)</td>
<td>68-88</td>
</tr>
</tbody>
</table>

Table 4: Pre/Post Morisky scores

<table>
<thead>
<tr>
<th>Morisky Score</th>
<th>Mean (S.D.)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-intervention</td>
<td>5.45 (1.31)</td>
<td>3-7</td>
</tr>
<tr>
<td>Post-intervention</td>
<td>3.95(1.87)</td>
<td>1-7</td>
</tr>
</tbody>
</table>

Table 5: Chi-Square Test and Fisher’s Exact

<table>
<thead>
<tr>
<th>Chi-Square Tests</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>7.500a</td>
<td>1</td>
<td>.006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correctionb</td>
<td>5.208</td>
<td>1</td>
<td>.022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>8.202</td>
<td>1</td>
<td>.004</td>
<td>.020</td>
<td>.010</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>7.125</td>
<td>1</td>
<td>.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 4.00.
b. Computed only for a 2x2 table
Appendix A: Educational Handout

The ABCD’s of Blood Pressure Measurement

Achieve a calm state

- Make sure you are quiet and relaxed
- Sit calmly without talking for about 5 minutes
  - Make sure your reading isn’t affected by: caffeine, alcohol, exercise or smoking

Body posture is important

- Sit in a chair with feet on the floor
- Legs should not be crossed
- Arm should be bare and should be supported at heart level

Calibrate & check equipment

- Use a properly calibrated and validated instrument
- Check the cuff size and fit
Double check any high readings

- If blood pressure registers high, take two readings 5 minutes apart
- Confirm any elevated readings in the opposite arm
Appendix B: Morisky 8-item Medication Adherence Questionnaire

**Morisky 8-Item Medication Adherence Questionnaire**

<table>
<thead>
<tr>
<th>Question</th>
<th>Patient Answer (Yes/No)</th>
<th>Score Y=1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you sometimes forget to take your medicine?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>People sometimes miss taking their medicines for reasons other than forgetting. Thinking over the past 2 weeks, were there any days when you did not take your medicine?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When you travel or leave home, do you sometimes forget to bring along your medicine?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did you take all your medicines yesterday?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When you feel like your symptoms are under control, do you sometimes stop taking your medicine?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often do you have difficulty remembering to take all your medicine?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>__ A. Never/rarely __ B. Once in a while __ C. Sometimes __ D. Usually __ E. All the time</td>
<td>A = 0; B-E</td>
<td></td>
</tr>
</tbody>
</table>

**Scores:** >2 = low adherence 1 or 2 = medium adherence 0 = high adherence

Figure 1 - Pre and Post Intervention Systolic Blood pressure
Figure 2 - Pre and Post Intervention Diastolic Blood Pressures
Figure 3

Clinic Monitoring

- Blood pressure machine: $0.40
- Transportation to clinic: $11.00
- Completing paperwork ($3.36 administration fee)
- Nurse performing blood pressure ($1.68 nurse wage)

Results
Total Cost: $16.44

Ambulatory Blood Pressure Monitoring (Kiosk)

- Kiosk blood pressure: $0.40
- Transportation to kiosk (at patient's convenience): $0.00
- No wait time: $0.00
- No nurse wage: $0.00

Instant Results
Total Cost: $0.40
Scholarly Project Conclusion

Hypertension in the African American population is a substantial problem that continues to grow. Medication adherence is one effective method to controlling blood pressure in African Americans. As discovered through the literature search, there have not been enough studies evaluating improving medication adherence and blood pressure control in a rural setting. As a result, there is minimal understanding of the population and its healthcare and other needs. It must be emphasized that accurate measurement of blood pressure is of fundamental importance in management of hypertension. Through this scholarly project, it was found that home blood pressure monitoring led to an increase in medication adherence. Although there was not significance in actual blood pressure control, this pilot study shows the need for further research in this population.

The writing and research of this project gave me the opportunity to expand ways to help the people of my community. The continuation of research in this area is critical in finding cost effective ways to manage this asymptomatic disease. As a healthcare provider, it is important to bridge the gap between the availability of effective interventions and successful control of hypertension.