

Education Utilization in Blood Pressure Management and Medication Adherence in

Hypertensive Adults

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Approved May 2018 by the faculty of UMKC in partial fulfillment of the requirements  
for the degree of Doctor of Nursing Practice

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### Abstract

Hypertension is a modifiable risk factor for serious chronic diseases including heart disease and stroke. Even with known benefits of hypertension management, only half of adults diagnosed have their blood pressure controlled. The purpose of this human subject, quasi-experimental study was to determine if patient hypertension education improved anti-hypertensive medication adherence in addition to blood pressure control and management. The study was conducted at a primary care clinic within an urban core health system in Missouri. There were five study participants. Patients were asked to participate in an educational session and complete home blood pressure monitoring. Upon completion of the education session, follow up calls were conducted to assess participants' blood pressure management. Post-intervention outcomes measures included medication adherence, post-intervention blood pressure values, and number of at-home monitoring days from the home blood pressure monitoring logs. There were two participants who completed all aspects of the study interventions. The study did not show an improvement in blood pressure control and medication adherence but positive responses were obtained from the participants. Effective interventions for increasing medication adherence and managing hypertension can prevent health complications, reduce healthcare costs associated with hypertension and decrease morbidity and mortality.

*Keywords:* hypertension, medication adherence, hypertension education, blood pressure control, primary care

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**Significance with Economic, Policy, Health System**

Hypertension continues to be one of the most preventable risk factors for many chronic diseases (Cappuccio, Kerry, Forbes, & Donald, 2004; Frieden, Coleman, & Wright, 2014; James et al., 2014). Per the Centers for Disease Control and Prevention, approximately one of three U.S. adults have high blood pressure (Centers for Disease Control and Prevention, 2016b). Of the approximately 75 million adults in the United States, only half of those individuals diagnosed with hypertension have it controlled (Centers for Disease Control and Prevention, 2016a). Hypertension can put a patient at risk for heart disease and stroke, two of the leading causes of death in Americans (Centers for Disease Control and Prevention, 2016a).

The overall costs correlated with hypertension are large considering the number of individuals and families affected by the disease (Go et al., 2014). The annual estimated cost associated with high blood pressure is \$51 billion with \$47.5 billion pertaining to direct medical costs (Centers for Disease Control and Prevention, 2014b). High blood pressure costs include the cost of health care services to manage hypertension, pharmacological modalities and missed days of work (Centers for Disease Control and Prevention, 2016b). The use of medications to control blood pressure is a cost-effective method to reduce cardiovascular morbidity and mortality (Elliott, 2003).

In the general population, those with hypertension are at greater risk for disability and earlier death than those with normal blood pressures (Elliott, 2003). Nonadherence to prescribed treatment plans can lead to poorer quality of life, adverse health outcomes, and ineffective disease management (Ahn & Ham, 2016; Costa et al., 2015). It is estimated that 40% to 60% of

patients with hypertension do not adhere to their prescribed treatment (Karakurt & Kasikci, 2012). Adherence to hypertension treatment, anti-hypertensive medications, and lifestyle modifications can be a cost-effective strategy for achieving desired outcomes, preventing complications, and improving the patient's quality of life (Chen, Tsai, & Chou, 2010; Elliott, 2003).

One of the objectives for the Healthy People 2020 topic of heart disease and stroke prevention is to increase the number of adults with hypertension who are taking prescription blood pressure medications (U.S. Department of Health and Human Services, 2017). Another objective is to increase the number of adults with hypertension whose blood pressure is controlled (U.S. Department of Health and Human Services, 2017). There are many factors that impact individuals' abilities to appropriately manage their condition (Conn, Ruppert, & Chase, 2016). Reasons for poor blood pressure control are variable; patients with hypertension may have poor disease awareness, may skip medications in the absence of symptoms, and may lack awareness of disease warning signs (Centers for Disease Control and Prevention, 2016a; Karakurt & Kasikci, 2012; Ma, 2016).

### **Local Issue and Diversity Considerations**

In the United States, hypertension is the leading reason why patients see their healthcare provider (Elliott, 2003). Of U.S. adults with uncontrolled hypertension, 90% have a source of health care and insurance coverage (Centers for Disease Control and Prevention, 2012). Therefore, there are missed opportunities to manage blood pressure, especially in the primary care setting where most patients with hypertension are encountered (Centers for Disease Control and Prevention, 2012).

From 2001 to 2009, the number of adults in Missouri who had hypertension increased by almost five percent (Li & Yun, 2013). Researchers estimated that in 2011, there were over 1.5 million adults in the state of Missouri who had high blood pressure (Li & Yun, 2013). There are groups that have a higher prevalence of high blood pressure including: those over the age of 65, African Americans, and those with lower socioeconomic status (Li & Yun, 2013). This indicates a large number of adults in Missouri are risk of high blood pressure complications including heart disease, stroke, and chronic kidney disease (Li & Yun, 2013).

The primary care clinic where the project took place serves a racially diverse group of patients that reflect the population in that county. Studies show that racial and ethnic disparities in hypertension and blood pressure control exist between Caucasians, African Americans, and Mexican-Americans in addition to racial and ethnic differences in patients who have uncontrolled hypertension (Valderrama, 2013).

### **Problem, Purpose**

#### **Problem Statement**

Hypertension is a modifiable risk factor with known benefits of management for preventable health conditions (Hacihanoglu & Gozum, 2011) yet only half of U.S. adults diagnosed have their blood pressure under control (Centers for Disease Control and Prevention, 2014b). The factors affecting patients from getting their blood pressure under control can be due to various causes including: a limited knowledge of hypertension and treatment, socio-economical nonadherence considerations, and lack of anti-hypertensive medication adherence (Conn et al., 2016; Elliott, 2003).

#### **Intended Improvement with Purpose**

The purpose of this evidence based practice project was to evaluate if an educational program led by the student investigator (SI) about hypertension, home blood pressure monitoring and follow-up phone calls could improve patients' blood pressure control and medication adherence in adults 18 years and older diagnosed with hypertension.

### **Facilitators and Barriers**

A strong evidence-base regarding quality care and financial benefit of managing hypertension is a facilitator for project implementation (Chen et al., 2010; Elliott, 2003). An additional facilitator for project implementation is the patients' personal support systems and support from primary health care providers at the implementation site (Bosworth et al., 2008; Harter et al., 2016; Ogedegbe, Harrison, Robbins, Mancuso, & Allegrante, 2004). Additional support was provided by the project facilitator.

The economic benefit of better blood pressure management was also a facilitator in project implementation at the primary care setting. As blood pressure control improves, there is a decrease in the number of medication adjustments and a decrease in the number of patient follow up visits and hospitalizations (Nuckols et al., 2011). Implementation of lifestyle modifications including reduced dietary sodium intake, aerobic physical activity, and limited alcohol intake are strategies that can be used for hypertension management (James et al., 2014). This can help reduce health care cost by \$37 per person annually (Nuckols et al., 2011) potentially saving \$55.5 million in the 1.5 million adults in Missouri who have high blood pressure (Li & Yun, 2013). Patients may be apt to continue their prescribed blood pressure treatment plan if they can impact the outcomes (Bosworth et al., 2008).

Barriers included patient time and willingness to participate. The main barrier was patient buy-in that their hypertension needed to be better managed. Patient enrollment and

participation in the educational session, lack of blood pressure measurement logging, and patients not answering their phone for the scheduled follow up calls were barriers to project implementation. Another barrier was patients not coming in to complete the post-intervention medication adherence scale survey and not returning their home blood pressure log.

### **Review of the Evidence**

#### **PICOTS**

In adults aged 18 years and older diagnosed with hypertension, does a specific educational program about hypertension and at home monitoring follow up by the nurse practitioner student improve blood pressure control and medication adherence over a three-month period in a primary care clinic?

#### **Search Strategies**

Keywords used in this search included “hypertension,” “high blood pressure,” “medication adherence,” “blood pressure control,” “hypertension education,” and “primary care” (see Appendix A). The keywords were searched through Cumulative Index to Nursing and Allied Health (CINAHL), PubMed, Medline, Cochrane Database of Systemic Review, and the National Guideline Clearinghouse. The search was filtered to articles dated from 2005 to present. A hand search of the reference list of articles closely related to the question was completed. Inclusion criteria included English language studies, studies reporting on at least one blood pressure outcome of interest, and studies involving a primary focus on hypertension. Exclusion criteria included foreign language studies, pediatric hypertension studies and those studies in which hypertension was reported as a secondary outcome of another medical condition.

A combination of 25 articles and evidence based guidelines contributed meaningful content to the PICOT question. Of these 25 studies, there were seven systematic review and/or meta-analysis (Level I), five evidence based recommendations (Level I), one review of literature (Level I), five randomized controlled trials (Level II), one prospective study design (Level II), four cross-sectional designs (Level IV), one qualitative study (Level VI), and one descriptive correlation design (Level VI; Melnyk & Fineout-Overholt, 2015).

### **Evidence by Sub-Topics**

The subtopics identified in the studies as known beneficial interventions included hypertension treatment (three articles), blood pressure monitoring (five articles), hypertension related education (seven articles), nonadherence to treatment factors (seven articles), management interventions (two articles), and medication adherence interventions (six articles; see Appendix B).

**Hypertension treatment.** The main objective of hypertension treatment and management is to maintain a goal blood pressure that has proven to decrease cardiovascular disease risks and improve patient outcomes (James et al., 2014). The diagnosis of hypertension is made when a patient presents with a blood pressure reading of greater than 140/90 on at least two separate occasions (Elliott, 2003; James et al., 2014; U.S. Preventative Services Task Force, 2007). Education regarding lifestyle modification is encouraged initially and if blood pressure continues to be elevated despite lifestyle modification, pharmacological therapy is considered (Armstrong, 2014; Go et al., 2014; Hacıhasanoglu & Gozum, 2011; James et al., 2014). The goal of blood pressure management and pharmacological treatment is less than 140/90 in adults 60 years and younger and less than 150/90 in adults 60 years and older (Armstrong, 2014; James et al., 2014). The selection of appropriate antihypertensive agent from the four specific classes

was determined from previously conducted randomized controlled trials (James et al., 2014) and is dependent on certain patient characteristics and co-morbidities (Armstrong, 2014; James et al., 2014). The U.S. Preventative Service Task Force recommends that all adults over the age of 18 be screened for high blood pressure (U.S. Preventative Services Task Force, 2007).

**Blood pressure monitoring.** Blood pressure measurement and management is often completed in the clinic setting; only recently has at home blood pressure monitoring become more popular with providers and patients (Agarwal, Bills, Hecht, & Light, 2011; Cappuccio et al., 2004). Patients who regularly have their blood pressure measured have been shown to take their anti-hypertensive medications as prescribed (Karakurt & Kasikci, 2012). Meta-analysis of studies reviewed by Cappuccio, Kerry, Forbes, and Donald (2004) found that home blood pressure monitoring resulted in better blood pressure control and achievement of goal blood pressures than standard blood pressure monitoring in healthcare facilities. This form of self-management can increase the patient's awareness of his or her disease in addition to assisting the provider in helping the patient maintain good blood pressure control (Costa et al., 2015; Go et al., 2014). Measuring and monitoring blood pressure has been found to be a physiological measure of adherence (Ireland, Arthur, Gunn, & Oczkowski, 2011).

**Hypertension related education.** Many studies in the literature concluded that educational interventions for the management of hypertension can increase medication adherence, impact healthier lifestyle behaviors, and decrease blood pressure measurements (Hacihanoglu & Gozum, 2011). Hypertension management topics addressed include side effects, memory problems with taking medications, risk factors and complications of hypertension, lifestyle modifications, and barriers to treatment adherence (Bosworth et al., 2008). It has been noted through systematic review and meta-analysis that interventions that were

completed with a group of patients rather than individually were more effective (Conn et al., 2016). Education provided to the patients to improve adherence included behaviors revealed to improve blood pressure, the role of anti-hypertensive medication in preventing long term complications, potential side effects of pharmacological treatment, benefits of hypertension management, and the hypertension disease process (Hacihasanoglu & Gozum, 2011; Karakurt & Kasikci, 2012; Ma, 2016). Studies have indicated that medication education alone has not been shown to improve adherence to treatment or keeping hypertension under control (Bosworth et al., 2017; Go et al., 2014). It is when medication education is combined with other behavioral interventions and hypertension education that adherence improves and there is a reduction in systolic and diastolic blood pressure readings (Costa et al., 2015; Hacihasanoglu & Gozum, 2011).

**Nonadherence to treatment factors.** A randomized control trial demonstrated that a shift in patient beliefs about antihypertension medications can produce behavioral changes leading to better medication adherence and blood pressure control (Alhalaiqa, Deane, Nawafleh, Clark, & Gray, 2012). Some of the predisposing and enabling factors of nonadherence to treatment recommendations include socio-economic status, health literacy, and self-efficacy (Ahn & Ham, 2016; Karakurt & Kasikci, 2012). Other suggested factors include age, gender, education, marital status, medication side effects, type of insurance and communication between provider and patient (Gadkari & McHorney, 2012; Ma, 2016). Reviewed studies show that lower economic status, lack of social support, and length of time since initial hypertension diagnosis were predictors of lower medication adherence (Gadkari & McHorney, 2012; Ma, 2016).

**Hypertension management interventions.** Patients can greatly benefit from having more support from healthcare providers in managing their chronic diseases including hypertension (Community Preventive Services Task Force, 2014). This can be completed by providing access to different resources and follow up calls at home (Community Preventive Services Task Force, 2014). These simple interventions can assist in supporting patients' self-management (Community Preventive Services Task Force, 2014). Self-management support for patients include increasing knowledge, skills, and refining the patients' attitudes towards addressing risk factors of hypertension and the disease process (Bosworth et al., 2017; Community Preventive Services Task Force, 2014).

**Medication adherence interventions.** Interventions that have been successful in patient medication adherence include those that use a combination of educational, behavioral, and provider interventions (Marcum, Hanlon, & Murray, 2017; Morrissey et al., 2016). Telephone follow-up was a commonly studied strategy in the literature; when used in combination with an educational component, patient adherence to treatment regimens improved. Bosworth et al. (2008) and Harter et al. (2016) demonstrated improved hypertensive patient self-management skills when regularly scheduled individualized coaching calls were provided. This can help the patient obtain a better understanding of the disease process, when to seek support, in addition to building a trusting relationship with his or her provider (Bosworth et al., 2008; Harter et al., 2016; Ogedegbe et al., 2004).

Studies have shown that various forms of reminders can be effective in influencing patient compliance to medication regimens (Boeni, Spinatsch, Suter, Hersberger, & Arnet, 2014; Bosworth et al., 2017; Costa et al., 2015; Ireland et al., 2011; Ogedegbe et al., 2004; Schneider, Murphy, & Pedersen, 2008). These reminders lead to patients taking their medications as

prescribed often leading to improved clinical results and improved medication adherence (Costa et al., 2015; Schneider et al., 2008).

### **Theory**

The foundation for the Theory of Planned Behavior is that the individual has the intention to perform a certain behavior (Ajzen, 1991). The stronger the individual's intention to perform the behavior, the more likely the individual will follow through with the behavior (Ajzen, 1991). There are three determinants of intention: attitude towards the behavior, subjective norm, and perceived behavioral control (Ajzen, 1991). Positive and negative aspects of blood pressure management will determine the patient's attitude towards the behavior. The patient's perception of adherence to the treatment plan is the subjective norm to the perceived social pressure to perform or not perform the behavior (Ajzen, 1991). This includes participating in the home blood pressure management follow up call. Perceived behavioral control refers to the patient's belief that he or she can measure his or her blood pressure at home and adhere to the prescribed medication regimen. The intended intention was participation in the program and attendance at the educational session. The stronger these three determinants were, the more likely there would be an increase in the intention to change (Ajzen, 1991). The ultimate behavior change was home blood pressure monitoring and medication adherence as shown in the adapted theory diagram (see Appendix C).

### **Methods**

#### **Site Approval, IRB Approval, Ethical Issues, Funding**

Site approval was obtained from the corporate director of clinical education and research at the implementation site (see Appendix D). The SI completed Collaborative Institutional Training Initiative (CITI) in June 2017. The institutional review board (IRB) approval for this

study was obtained from the University of Missouri Kansas City (see Appendix E). Approval for human subject research under expedited review was granted on October 15, 2017.

Informed consent for use of the data collected from the surveys, demographic forms, blood pressure logs, and obtained blood pressure pre- and post-intervention was completed by patients. Patients were informed that personal information would be protected and health information would not be shared. The patient had the autonomy to determine if he or she would participate in the education session and complete the at home blood pressure monitoring. The opportunity to participate was offered to all patients who met the inclusion criteria allowing for fair involvement that did not restrict patient participation based on religion, race, ethnicity or gender. Privacy and protection of the obtained patient information were maintained according to the Health Insurance Portability and Accountability Act (Terry, 2015). There were no SI conflicts of interest.

Direct and indirect cost of the project were based on materials, supplies, and personnel required for implementation (see Appendix F). Budgeted indirect and direct cost was \$212.16. Indirect cost included SI's time for project recruitment, planning and coordination of interventions. The SI covered the costs of the project.

### **Setting and Participants**

The project setting was a primary care clinic within an urban core health system in Missouri. Inclusion criteria were adults age 18 years or older, essential hypertension diagnosis, prescription of at least one anti-hypertensive agent, access to blood pressure monitoring system at home, and English speaking capability. Determined exclusion criteria included adult patients who have mental incapacity, secondary hypertension, and did not understand English. The sampling method was convenience sampling. There were 67 eligible participants approached to

participate in the study with 33 individuals who initially agreed to participate. Upon time of the educational intervention, there were five study participants.

### **Evidence Based Practice Intervention**

The evidence based intervention contained three main components to improve blood pressure management and medication adherence: education, behavioral interventions, and follow-up. The evidence based practice project implementation took place over a six-month period (see Appendix G). Prior to project initiation, a planning meeting was scheduled with the primary care providers at the clinic to discuss the project intervention. Discussion topics included if clinic providers would assist in identifying potential participants and encouraging patient participation. During the meeting, a patient plan of action was created and mutually agreed upon by the SI and the primary care providers. This included patient instructions on what he or she should do if they have routinely high or low blood pressures at home, difficulty with medication adherence related to side effects and course of action for other concerning symptoms. Based on recommendations by the SI, the primary care providers determine what blood pressure values would be defined as low or high. Then it was determined what values necessitated a call from the patient to his or her primary care provider. Discussion also included how patient concerns would be addressed either directly by the SI or by the clinic (see Appendix H). The SI scheduled days to be at the clinic for study participant recruitment. The days the SI was at the clinic for recruitment, a daily list of clinic patients was obtained and patients were screened for study eligibility. Study flyers were also utilized at the clinic site to recruit participants (see Appendix I). Interested participants could contact the SI to participate in the study. Patients who were eligible to participate in the study were approached by the SI during their clinic visit.

Eligible and interested participants were informed about the time and place for the educational session. On the day of the student investigator-led education session, consents to participate in the study, a demographic form and a pre-intervention medication adherence scale survey were completed (see Appendix J, Appendix L). Literate patients were given the demographic form and medication adherence scale survey to fill out on their own. Illiterate patients had the documents read to them by the SI and the responses were documented. The student investigator-led education session lasted approximately 30 minutes with topics that included hypertension management and treatment based on the information found in the *Understanding and Managing High Blood Pressure* workbook created by the American Heart Association and American Stroke Association (see Appendix K). Education regarding home blood pressure monitoring, blood pressure log usage, importance of medication adherence and medication reminder methods were also discussed. Each study participant received a copy of the workbook to keep. The study participants' electronic medical records were accessed by the SI to obtain the three most recent three blood pressure values from all available outpatient clinic visits that were completed prior to project implementation. Those blood pressure values were averaged and used as the pre-intervention blood pressure (see Appendix L).

The second component included behavioral interventions involving home blood pressure monitoring, blood pressure measurement logging, and adherence to prescribed medication regimen. Participants were asked to log their blood pressure twice a day, two times a week for three months utilizing the supplied log (see Appendix L). Follow-up phone calls were made to the participants by the SI at two, six, and nine weeks after the education session (see Appendix L). Follow up topics included participants' usage of the blood pressure log and adherence with taking their prescribed anti-hypertensive medications in addition to reiterating the topics

discussed during the education session. At the end of the nine-week follow-up phone calls, the SI requested the participants to come to the project site for post-data collection.

At the three month follow up, the medication adherence scale survey was re-administered to the participants and copies of the participants' three-month home blood pressure logs were obtained to be used for analysis. The study participants' electronic medical records were accessed again by the SI to obtain the three most recent blood pressure values from all available outpatient clinic visits within the three-month intervention period. For those patients who did not have three recent blood pressure that could be utilized for analysis, values from three separate days on the home blood pressure log was utilized. The blood pressure values were averaged and used as the post-intervention blood pressure.

### **Change Process, EBP Model**

The evidence based practice (EBP) model used was the Iowa model of EBP. Triggers are a key concept in the Iowa model of EBP as it prompts the initiation of the EBP project (Gawlinski & Rutledge, 2008; Melnyk & Fineout-Overholt, 2015). A team is then formed to develop, implement and evaluate the practice change (Gawlinski & Rutledge, 2008; Melnyk & Fineout-Overholt, 2015). Available research data about the topic is selected, reviewed, critiqued, and synthesized by the team (Gawlinski & Rutledge, 2008; Melnyk & Fineout-Overholt, 2015). A practice change is then piloted and once completed, determination is made about the appropriateness of implementing the intervention beyond the pilot (Gawlinski & Rutledge, 2008; Melnyk & Fineout-Overholt, 2015). Evaluation continues and dissemination of the information occurs (Gawlinski & Rutledge, 2008; Melnyk & Fineout-Overholt, 2015).

Kotter and Cohen's Model of Change was the intended model of change for this evidence based practice project. This particular model of change is based on the idea that individuals are

more apt to change their behavior when facts affect their emotions and feelings (Appelbaum, Habashy, Malo, & Shafiq, 2012; Melnyk & Fineout-Overholt, 2015). The model starts with creating a sense of urgency to make a change then moves on to obtain buy-in, create short-term gains and ensure that the changes persist (Appelbaum et al., 2012; Melnyk & Fineout-Overholt, 2015). This model combines teamwork, quality improvement and utilization of evidence based practice (Melnyk & Fineout-Overholt, 2015). The combination of these two models provide the basis for strengthening the project interventions even after the project has been completed. Continuous evaluation of the outcomes and buy-in by the patients and providers will sustain the intervention.

### **Study Design**

The evidence based practice project was a human research, quasi-experimental study. Patients with hypertension who met the criteria were invited to participate in the intervention. Consents, demographic information, pre-intervention blood pressure measurements, and a pre-intervention medication adherence scale survey were completed by participants prior to the educational session. The participants were then followed up via phone by the SI about home blood pressure monitoring and adherence to taking anti-hypertensive medications. Measurement of the intervention outcomes included data collected from the medication adherence scale surveys, home blood pressure monitoring logs, in addition to the pre- and post- blood pressure measurements.

### **Validity**

**Internal validity.** One aspect of the project that promoted internal validity was recruitment of all patients who were diagnosed with hypertension. Consistent use of measurement tools throughout the study also promoted internal validity. A potential

confounding influence was participants' unknown exposure to other educational material about hypertension. The American Heart Association recommends using an automatic upper arm cuff-style monitor for home blood pressure monitoring (American Heart Association, 2016). Since there are wrist, finger, and bicep blood pressure monitors, the type of home blood pressure monitoring system the participants have at home was another potential confounding factor. Home blood pressure monitoring technique varied from patient to patient leading to varied results. Another risk to internal validity was that home blood pressure readings from the blood pressure logs were utilized for the post-intervention analysis.

**External validity.** The small sample size and usage of convenience sampling affected the external validity of this project. The larger the sample size, the better generalizability to other populations (Terry, 2015). Education about medication management and disease management could be applied to chronic conditions other than hypertension. Since the study was completed in an urban core population, there was the possibility that the results obtained could be generalizable to other urban core populations and to English speaking patients.

### **Outcomes Measured**

The primary outcomes for this project were improved anti-hypertensive medication adherence and improved blood pressure control. Anti-hypertensive medication adherence was measured by the patients' pre- and post-responses on the medication adherence survey. Improved blood pressure control was determined from the post-intervention blood pressure reading measurements. The reading was categorized as controlled or non-controlled based on the recommended blood pressure range established by the Eighth Joint National Committee (JNC 8) for the Management of Hypertension in Adults practice guidelines (Armstrong, 2014). A controlled blood pressure was defined as a systolic blood pressure less than 140. An

uncontrolled blood pressure was defined as a systolic blood pressure greater than 140. The secondary outcomes after project completion included continued home blood pressure monitoring and medication adherence in addition to blood pressure measurements within the recommended range.

### **Measurement Instruments**

Medication adherence was measured utilizing a medication adherence scale survey found in the public domain. The tool that was used for this was the Morisky, Green, Levine (MGL) Adherence Scale. Permission to use this scale was obtained from Donald E. Morisky, co-author of the Morisky, Green, & Levine (1986) study. The reliability of the adherence scale is strengthened by its measured internal consistency of 0.61 (Morisky, Green, & Levine, 1986).

Outpatient clinic and home documented blood pressure values were used to measure blood pressure control. Results were obtained from blood pressure measurements in the patients' electronic medical records. The home blood pressure logs were used to document how many days home monitoring was achieved by the participant. Blood pressure values via manual and electronic blood pressure cuffs have been utilized for physiological measurement, encouraging reliability and validity of the tool because it measures what it is intended to measure (Melnik & Fineout-Overholt, 2015). Participants were taught about how to take their blood pressures and how to write their results on the blood pressure monitoring log. The averaged pre- and post-intervention blood pressure were collected from the participants' electronic health records by the SI.

### **Quality of Data and Analysis Plan**

Since participation in the study was voluntary, nonresponse bias should be considered (Polit & Beck, 2012). Selection bias occurred because a nonrandomized procedure was used to

get participation involvement (Polit & Beck, 2012). The same medication adherence questionnaire was administered pre- and post-intervention as a consistent measurement tool. Distribution of the obtained results was assessed and anomalies that affected the interpretation of the results were considered (Polit & Beck, 2012). A power analysis was completed and it was determined that 35 participants were needed for an effect size of 0.5, a power of 0.8, and a significance level of 0.05. The blood pressure readings obtained were objective data. Depending on blood pressure taking technique, the quality of the data collected may have been affected.

Data were collected and analyzed using SPSS Version 24 (see Appendix P) and collected data were stored using REDCap electronic data capture tools hosted at the University of Missouri Kansas City (Harris et al., 2009). Descriptive statistics were utilized for the demographic information obtained from the participants (see Appendix Q). Descriptive statistic was also utilized for pre- and post- intervention systolic blood pressure, pre- and post-intervention diastolic blood pressure, pre- and post-intervention medication adherence response, and the number of days the participants logged a home blood pressure reading (see Appendix Q).

## **Results**

### **Setting and Participants**

The study was conducted October 2017 – April 2018. The project setting was primary care clinic within an urban core health system in Missouri. The education sessions took place in a classroom and a private room within the clinic area. There were 67 patients at the clinic that met the eligibility criteria to participate in the study. Of the eligible 67 participants who were invited, 33 individuals agreed to participate in the study. Of the 33 who initially agreed, five individuals attended an education session and participated in the project interventions. Study

participants included five black, non-Hispanic adults whose age range was 45 – 64 years old. There were four females and one male participants. There were two participants who had less than high school diploma and three that had some college as their highest educational status. All five participants had some form of health insurance. There was one participant who had been diagnosed with hypertension for 1 – 5 years, two participants who had been diagnosed for 6 – 10 years, and two who had been diagnosed for greater than 10 years. There was one participant who was taking one blood pressure medication, one participant who was taking two blood pressure medications, and three participants who were taking three or more blood pressure medications. There were two participants who used tobacco products in the past and three participants who are currently using tobacco. There was one participant who used alcohol in the past, the other four participants are current alcohol users (see Appendix Q).

### **Intervention Course**

The EBP project started in June 2017 with CITI training, IRB application and approval. Prior to the initiation of the project, a planning and coordination meeting took place with the primary care clinic providers to discuss the project intervention. After IRB approval, the SI began the study recruitment phase of the project. This took place from November 2017 – January 2018. The SI obtained the daily clinic schedule and was guided by the primary care provider to determine which patients met the criteria for study participation. Eligible participants were approached by the SI during their scheduled clinic appointment. The eligible participants who were interested in participating were given a recruitment postcard with information about the study. Interested participants then gave their phone number to the SI to be contacted with information about the education session and active participation in the study. Reminder phone

calls were made to the interested individuals a week before the education session that took place January 2018.

There were three of the 33 eligible and interested individuals who attended the education session. Revisions were made to the IRB due to low participation rate. Once the revisions were approved by IRB, an education session and enrollment in the study were conducted during clinic appointments with interested, eligible individuals. Two additional participants were added through this process. There was a total of five individuals who consented and participated in an education session. Consents to participate in the study, a demographic form and a pre-intervention medication adherence scale survey were completed prior to education. A 30-minute PowerPoint presentation based on the information found in the *Understanding and Managing High Blood Pressure* workbook was presented by the SI. Study participants received a copy of the workbook to keep. The participants were asked to monitor and log their home blood pressure readings twice a day, two times a week for three months. Pre-intervention blood pressure readings were obtained from the participants' medical records after consent and education session was completed.

After the education session, follow up phone calls were conducted from January 2018 – to April 2018. Follow up phone calls were conducted two, six, and nine weeks after the attended education session. The two-week post-education follow up phone calls were completed with the five project participants. The six-week follow up phone calls were completed with four of the project participants. One study participant did not answer the phone or return the call. The nine-week post-education follow up phone calls were completed with four of the project participants as one participant did not answer the phone or return the call. After completion of the follow up phone calls, a clinic return date for post-intervention collection was scheduled. There were two

scheduled post-intervention collection dates set up with the four participants. There were two participants who submitted their three-month blood pressure logs and completed a post-intervention MGL medication adherence scale survey (see Appendix Q).

Upon completion of the scheduled post-intervention collection dates, post-intervention blood pressure readings for the two participants who completed the study were obtained. Since there were no post-intervention outpatient setting blood pressure readings found in the participants' charts, the three most recent blood pressure readings from their home blood pressure logs were utilized for analysis.

### **Outcome Data by Subtopic**

Analysis was completed on medication adherence and controlled vs. non-controlled blood pressure readings. Based on the data collected, participants had medium adherence to their medications and non-controlled blood pressure control. Another outcome for this project was improved anti-hypertensive medication adherence. Adherence was determined based on the patients' pre- and post-responses on the medication adherence survey. The results did not show a change in medication adherence pre- and post-intervention in the two participants who complete the study (see Appendix Q).

A second outcome for this project was improved blood pressure control. During the follow up phone calls, patients did not report consistently high blood pressures that prompted the patient to contact their provider. Reported blood pressures were not beyond the parameters discussed with the healthcare providers. Improved blood pressure control was determined from the post-intervention blood pressure reading measurements. The readings were categorized as controlled or non-controlled based on the recommended blood pressure range established by the Eighth Joint National Committee (JNC 8) for the Management of Hypertension in Adults

practice guidelines. Based on the averaged blood pressure readings post-intervention of the participants who completed the study, their blood pressures were non-controlled (see Appendix Q). One participant who completed the study did report blood pressure readings that were categorized as non-controlled but the post-intervention systolic reading was closer to the goal blood pressure.

Missing data included post-intervention medication adherence scale survey data, post-intervention blood pressure readings, and number of days blood pressure was logged at home of study participants who did not submit post-intervention or complete the study (see Appendix Q).

## **Discussion**

### **Successes**

During the follow-up phone calls, participants expressed how they appreciated the follow up phone calls during the intervention period. They liked being able to periodically speak with a healthcare provider about their blood pressure management. It also gave them an opportunity to talk about additional stressors in their life that affect their blood pressure. Participants were also given the opportunity to discuss additional lifestyle modifications they have been utilizing to help them control their blood pressure. They expressed how hearing additional medication reminder methods helped them remember to take their anti-hypertensive medications. The greatest success from the study was that participants reporting feeling overall better through the management of their blood pressure.

### **Study Strengths**

Study strengths included having primary care providers who encouraged patients to consider participation in the study. The providers at the clinic helped with project implementation by their willingness to discuss with the patient the importance of home blood

pressure monitoring. Some providers even provided a prescription for the patient to obtain a blood pressure cuff for home use if they were interested in home blood pressure monitoring.

Management and other key personnel in the clinic were additional strengths to the study. They assisted the SI in obtaining a room for education and encouraging patients to participate in the study. They were accommodating to the SI in regards to computer access and obtaining needed information about the study participants.

Intervention implementation for the project was another successful aspect of the project. Being able to conduct the education sessions and follow up phone calls were easily completed during the intervention period. The education sessions took place in a classroom and private room in the clinic that was easily accessible to the study participants. Another study strength was participants could utilize their own blood pressure monitoring systems at home. Participants expressed having the equipment available to them either at home or through local convenience stores and pharmacies helped them in monitoring their blood pressure outside of the healthcare setting.

### **Results Compared to Evidence in the Literature**

Data collected from the study did not result in improved blood pressure control but participants enjoyed the interaction and added support with their health condition from a healthcare provider. Evidence from the literature states that adherence to hypertension management can lead to improved patient's quality of life (Chen et al., 2010; Elliott, 2003; Hacıhasanoglu & Gozum, 2011). During the follow up phone call intervention, study participants reported an improved quality of life and increased efforts in making lifestyle changes to help reach their blood pressure goals. Based on the results of the two participants who completed the study, anti-hypertensive medication adherence is medium to high. This

strengthened the conclusion made by Ireland et al (2011) regarding the use of blood pressure monitoring as a physiological measure of adherence. Findings from a systemic review and meta-analysis completed by Agarwal, Bills, Hecht, & Light (2001) showed that home blood pressure monitoring may have a role in improving components of blood pressure. This finding was also noted in the one participant who completed the 18 days of home blood pressure monitoring and had a post-intervention blood pressure closer to goal blood pressure range. Studies have concluded that medication education alone will not improve hypertension control as effectively as incorporating behavioral interventions and hypertension education (Bosworth et al., 2017; Costa et al., 2015; Go et al., 2014; Hacıhasanoglu & Gozum, 2011). During the follow up phone calls, participants expressed how education about their anti-hypertensive medications in addition to the information about risk factors affecting blood pressure helped them determine what they could do to reach their blood pressure goal.

### **Limitations**

#### **Internal Validity Effects**

Convenience sampling was utilized for the study and most the study participants were female. An additional confounding variable included patients receiving hypertension management education from additional sources. Patients who were enrolled in the study were seeing other medical specialties who may have discussed how their condition affects their blood pressure. There were other confounding factors that were not considered in regards to blood pressure including chronic pain and patient technique in obtaining blood pressure readings.

#### **External Validity Effects**

Possible sources of confounding factors affecting generalizability was the study participants' homogeneity. Study participants were of the same ethnic group, age range, and

only one participant was a different gender. This affects how generalizable the collected data would be to a population in other urban outpatient settings that is like the project setting.

### **Sustainability of Effects and Plans to Maintain Effects**

A plan for sustainability post-study was suggested to the clinic to conduct periodic phone calls with patients in regards to their blood pressure management. Home blood pressure monitoring logs can be given out to clinic patients to help remind them to continue monitoring their blood pressure at home, even after the study has concluded. A potential gain from the study is home blood pressure monitoring as a means of blood pressure awareness when it comes to taking prescribed anti-hypertensive medications.

A plan for maintaining blood pressure control could include providing patients with a home blood pressure monitoring log that can be utilized throughout the year. Another means of sustaining the benefits of the project would include having the providers discuss the topics of blood pressure management that were addressed in the project intervention period. Repetition of the data can help patients with continued reinforcement of the pertinent information.

### **Efforts to Minimize the Study Limitations**

There were measures taken to minimize limitations in this study. All eligible participants for the study were approached about participating in the study. Another measure that was taken to minimize limitations in the study was conducting additional education sessions to encourage study participation. SI also reviewed blood pressure monitoring technique as a means of minimizing study limitations.

The limitations of the study, specifically the threats to external validity, affected the interpretation and application of findings. One major limitation of the study was a small sample group. There was a small sample group for the study and generalizability to similar populations

would not be accurately obtained because of the homogeneous group of participants. With limited number of study participants, it is difficult to adequately determine if the intervention impacted the outcomes of patient blood pressure management. This could have led to a subsequently under powered study.

### **Interpretation**

#### **Expected and Actual Outcomes**

An expected outcome from the study was improved medication adherence scores, based on medium or high adherence. The two study participants who completed all the intervention parts did not have an improve medication adherence score but rather the same. Another expected outcome was that blood pressure after the interventions would be categorized as controlled. Although the participants' blood pressure readings were categorized as non-controlled, one did have a post-intervention readings closer to the recommended goal blood pressure.

One major problem encountered by the SI for this study was participation. There were over 50 individuals invited to participate. There were five participants with only two completing the study from beginning to end. Failures in the expected and actual outcomes may be due to low participation. It was difficult to obtain enough data from the study to determine if there was any significance for practice change.

Possible reasons for differences between observed and expected outcomes include patient drive for participation and time of the year in which the intervention was conducted. The study was conducted during the winter season, in which many of the patients have a difficult time with transportation, travel in unforeseen weather conditions, patient motivation, and phone access.

#### **Intervention Effectiveness**

Inferences consistent with the strength of the study data include strong educational information from a reliable source and an intervention that is evidence based to improve medication adherence and blood pressure management. The setting where the study was conducted was a teaching based hospital and patients were aware of additional educational opportunities for medical care and management.

The types of settings in which the study intervention is most likely to be effective include an outpatient setting that has the time to conduct patient education at the time of the patient's visit to the clinic. It would also be helpful if the patient had the means to travel to the education site, receive phone calls, participate in additional interventions, and put in the effort of completing home blood pressure monitoring.

**Intervention revision.** Intervention modifications that might improve attainment of outcomes would include having the educational session completed while the patient is already at their appointment. In this study, two study participants were recruited by approaching them during their clinic appointment. Discussion with the patient prior to their appointment or initially meeting with the patient to discuss the study then conducting the intervention might be more successful and participation may increase. Patient education can be utilized to highlight different aspects of blood pressure management that patients can act upon to improve hypertension management (Hacihasanoglu & Gozum, 2011). An intervention revision that can encourage blood pressure management would be having more than one educational session for the patient to attend. The educational sessions can take place multiple times during the week at different times of the day and can incorporate different teaching modalities.

**Expected and Actual Impact to Health System, Costs, and Policy**

The overall costs related to the project were minimal compared to the overall cost of managing a hypertensive patient. The project was a cost-effective method of increasing blood pressure awareness and means of management. There is great potential for economic sustainability of this intervention. Education must be provided to the providers at the outpatient clinic for cooperation in continuing these interventions to help improve medication adherence and blood pressure control. The cost of printing home blood pressure monitoring logs is low in comparison to the cost of implementing additional blood pressure medications to the regimen or a blood pressure that results in a myocardial infarction or stroke as an outcome of poor management (Centers for Disease Control and Prevention, 2014b, 2016b). There were no funding sources for this evidence based practice study. The totality of the project was SI funded.

### **Conclusion**

#### **Practical Usefulness of Intervention**

Hypertension is a major preventable risk factor for many chronic conditions (Cappuccio et al., 2004; James et al., 2014) yet many patients who are diagnosed with this disease do not have it properly controlled (Centers for Disease Control and Prevention, 2016a). Proper treatment and management of hypertension can help in reducing a patient's risk for myocardial infarctions, stroke and kidney disease (Armstrong, 2014; Centers for Disease Control and Prevention, 2016a; Frieden et al., 2014; Hacıhasanoglu & Gozum, 2011). Patient education and increased knowledge helps to empower patients to be more aware of their blood pressure and affords the opportunity to adequately manage it. Education provided to the patient to improve adherence includes behaviors revealed to improve blood pressure, the role of antihypertensive medication in preventing long term complications, potential side effects of pharmacological treatment, benefits of hypertension management, and the hypertension disease process

(Hacihasanoglu & Gozum, 2011; Karakurt & Kasikci, 2012; Ma, 2016). The interventions help to improve blood pressure management leading to decreased patient complications, improved quality of life, health outcomes, disease management and decreased healthcare costs associated with hypertension (Chen et al., 2010; Elliott, 2003; Hacihasanoglu & Gozum, 2011)

### **Further Study or Implementation of Intervention**

Follow up phone calls or other forms of reminders can be implemented at the clinical site once the project period is over. Bosworth et al. (2008) and Harter et al. (2016) demonstrated that hypertension self-management can be improved with regularly scheduled coaching calls. Encouragement from the healthcare staff in regards to hypertension education can be provided. The educational material can be distributed to patients diagnosed with hypertension and consideration for periodic educational sessions can be offered to the patients.

### **Dissemination**

Abstract submission for the project was submitted and accepted to the Advanced Practice Nurses of the Ozarks Annual Conference Poster Presentation that took place on November 10, 2017.

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## Appendix A. Definition of Terms

Blood pressure: the force of blood against the walls of blood vessels, specifically arteries (Centers for Disease Control and Prevention, 2014a).

Hypertension: a high arterial blood pressure that presents as a systolic blood pressure of 140 mm Hg or greater or a diastolic blood pressure of 90 mm Hg or greater (James et al., 2014; U.S. Preventative Services Task Force, 2007).

Medication Adherence: the degree to which a patient's actions when taking prescribed medications match the recommendations of his or her health care provider (Cramer et al., 2008).

Primary Care: the patient's first source of regular medical care and starting point for health care service referrals (American Academy of Family Physicians, 2017).

## Appendix B. Synthesis of Evidence Table.

In adults aged 18 year or older diagnosed with hypertension, does a specific educational program about hypertension and at home monitoring follow up by the nurse practitioner student improve blood pressure control and medication adherence over a 3-month period in a primary care clinic?						
Subtopic: Medication Adherence Interventions						
First author, Year, Title, Journal	Purpose	Research Design <sup>1</sup> , Evidence Level <sup>2</sup> & Variables	Sample & Sampling, Setting	Measures & Reliability (if reported)	Results & Analysis Used	Limitations & Usefulness
Marcum (2017). Improving medication adherence and health outcomes in older adults: An evidence-based review of randomized controlled trials. Drugs Aging	Updated summary of evidence from RCT to determine what interventions are most beneficial to implement for medication adherence in older adults in the community setting	Quantitative. Systematic review of randomized controlled trials; Level I. Various variables depending on study reviewed (medication adherence components)	Randomized controlled trials that had medication adherence interventions Samples, sample selection, and setting dependent on study.	Measures discussed depending on the type of intervention and study completed.	12 articles used after exclusion criteria was evaluated. Studies were then categorized by the type of intervention.	Intervention discussed and how it affects health outcomes; determined which interventions resulted in better adherence. Publication bias and only three search engines used
Bosworth (2016). Recommendations for Providers on Person-Centered Approaches to Assess and Improve Medication Adherence	Provide methods and tools that healthcare providers can implement to help improve medication adherence	Recommendations based on previous studies. Level I. No variables noted.	NA	NA	Recommendations for implementation of known effective medication adherence interventions	Patient centered approaches for medication adherence, Provider and patient recommendations

Harter (2016). Effectiveness of telephone-based health coaching for patients with chronic conditions: A randomised controlled trial. PLoS ONE	Determine if telephone based health coaching would be beneficial in patients with chronic conditions.	Quantitative prospective RCT; Level II; Control group vs. Intervention group [three different groups (chronic campaign, heart failure campaign, mental health campaign)]	N=10,815 eligible for coaching intervention (varied number for each group); phone call coaching in Germany	Outcome measurements include time to hospital readmission, hospital use, medication & inability to work, mortality.	TBHC may reduce mortality as a strong patient-relevant outcome; Propensity score matching; sample analyzed using three approaches; Kaplan Meier curves	Participants who were not able to read were not included in the study. Bias for certain diagnoses; Large study number.
Boeni (2014). Effect of drug reminder packaging on medication adherence: A systematic review revealing research gaps. Systematic Reviews	Determine if drug reminder packaging effect medication adherence	Quantitative, Systematic review, Level I.	30 references that met the inclusion criteria; mean number of participants was 191, average age 62 years fold, average 3.9 medications	Any measurement that estimated adherence was utilized as adherence outcome	Clinical outcomes were used for measurement, reviewed effect on adherence, methodological quality and completeness of information; patient outcomes	Positive results for drug reminder packaging for medication adherence and clinical outcomes; underreporting of issues, incomplete information
Bosworth (2008). Take control of your blood pressure study: A multifactorial tailored behavioral and educational intervention for achieving blood	Evaluating how a personalized intervention improves blood pressure control	Quantitative; Randomized controlled trial; Level II; randomized into four groups then groups were combined as either the control (usual care, home	Medical electronic database to identify patients with hypertension diagnosis; 319 adults with hypertension;	All groups were contacted at the 6-month and 24-month post baseline evaluation; Morisky Self-Reported	Intervention group had 9% increase in self-reported medication adherence from baseline while control group only had 1% increase.	Self-reported adherence results might not be representing actual adherence; number of blood pressure medication taken by the participant only known from

pressure control. Patient Education and Counseling		blood pressure monitoring alone) or intervention (tailored behavioral intervention, both tailored behavioral intervention and home blood pressure monitoring)	Southeast United States	Medication Taking Scale		what the patient states;
Schneider (2008). Impact of medication packaging on adherence and treatment outcomes in older ambulatory patients	Evaluate adherence to medication treatment when using daily dose blister packs versus bottle of loose pills	Quantitative; Randomized control trial. Level II. Blister pack daily dosing medication prescription, bottle of loose pills prescription	Patients 65 years or older with diagnosis of essential hypertension, 85 participants from three centers in Ohio and Arizona	Demographic s, percentage of refills on time, mean SBP and DBP and serum creatinine	Patients who used the daily dose blister pack completed refills on time, greater medication compliance, lower diastolic two sample <i>t</i> tests, nonparametric Wilcoxon rank-sum tests, $\chi^2$ tests or Fisher's exact tests BP	Strengthens evidence for use of daily dosing blister packs. Helps with proper medication administration; Limitation was small study group, tracking only one disease, short time frame.
Subtopic: Hypertension Related Education						
<b>First author, Year, Title, Journal</b>	<b>Purpose</b>	<b>Research Design<sup>1</sup>, Evidence Level<sup>2</sup> &amp; Variables</b>	<b>Sample &amp; Sampling, Setting</b>	<b>Measures &amp; Reliability (if reported)</b>	<b>Results &amp; Analysis Used</b>	<b>Limitations &amp; Usefulness</b>
Ahn (2016). Factors	Determine components of	Quantitative; Cross-sectional	Convenient sample of 289	Study questionnaire;	General participant	Described predisposing

<p>associated with medication adherence among medical paid beneficiaries with hypertension. Western Journal of Nursing Research</p>	<p>medication adherence in medical-aid beneficiaries with hypertension</p>	<p>study; Level IV; health literacy scores, self-efficacy, pros-cons of chronic disease management, medication adherence</p>	<p>patients in South Korea</p>	<p>Modified Morisky Scale, rapid estimate of adult literacy in medicine, General self-efficacy questions; pros and cons questions on diet, exercise, and medication adherence</p>	<p>characteristics descriptive analysis on study variables, hierarchial multiple regression analysis for factors associated with medication adherence</p>	<p>factors and enabling factors associated with medication adherence in patients with hypertensive patients</p>
<p>Conn (2016). Blood pressure outcomes of medication adherence intervention: systematic review and meta-analysis. J Behav Med</p>	<p>Determine overall effect of adherence interventions, intervention variation based on sample and study characteristics, effect of intervention features, risk of bias in existing research and association with effect size</p>	<p>Quantitative; systematic review and meta-analysis; Level I; blood pressure outcomes of medication adherence interventions</p>	<p>156 reports with 60,876 participants</p>	<p>Standardized mean difference effect sizes, treatment vs. control post-intervention effect size</p>	<p>Exploratory dichotomous and continuous moderator analyses</p>	<p>Systolic outcomes, diastolic outcomes; behavioral change intervention characteristics, overall effects of different interventions on blood pressure outcomes</p>
<p>Ma (2016). A cross-sectional</p>	<p>Describe medication</p>	<p>Quantitative. Cross-sectional</p>	<p>Convenience sampling from</p>	<p>Questionnaire for socio-</p>	<p>Larger number of non-adherent</p>	<p>Participants selected from</p>

<p>survey of medication adherence and associated factors for rural patients with hypertension. Applied Nursing Research</p>	<p>adherence and determine what various factors predict medication adherence</p>	<p>design. Level IV. Variables include demographic information, adherent vs. non-adherents</p>	<p>medical outpatient department of three rural township hospitals in China</p>	<p>demographic and clinical information; Morisky medication adherence scale; Social support rating scale.</p>	<p>patients; Patient recently diagnosed, symptomatic, and less pills a day were more compliant, higher support system, higher household income, over the age of 45 also more compliant. Frequencies and percentages for categorical variables, univariate analyses, <i>t</i>-tests and chi-square tests to compare characteristics of adherents and non-adherents.</p>	<p>only one hospital in one region. Some participants had lower education level- could not understand questionnaire or how to fill out the scales; symptoms and complications self-reported- possible underestimation</p>
<p>Costa (2015). Interventional tools to improve medication adherence: review of literature. Patient Preference and Adherence</p>	<p>Review the most commonly used interventions for medication adherence, measured outcomes, and improvements achieved, and</p>	<p>Review of literature, Level I, variables included interventions including behavioral, educational integrated care, self management,</p>	<p>Numerous different articles in regards to medication adherence</p>	<p>Measures and reliability not noted in the article.</p>	<p>Conclusion made from the articles review by the group. Medication adherence remains a challenge for health care</p>	<p>Emphasized different interventions that may show an improvement in patient adherence to treatment/ medications usage. Pointed</p>

	look at limitations of the interventions	and risk communication. Also included packaging and daily reminders			providers, poor adherence can be associated with poor health outcomes, lower QOL, high health care costs. Improving medication adherence dependent on the clinical condition being assessed.	out limitations in other medication adherence studies
Hacihasanoglu (2011). The effect of patient education and home monitoring on medication compliance, hypertension management, healthy lifestyle behaviours and BMI in primary health care setting. Journal of Clinical Nursing	Determine how anti-hypertensive patient oriented education and in home monitoring for medication adherence by providing education on healthy lifestyles, behaviors, and medication adherence.	Quantitative; Randomized controlled study. Level II. Pretest-post-test study.	120 hypertensive patients; Conducted at 3 public primary health care facilities and in the home of participants	Systolic and diastolic blood pressures, height, weight, BMI, descriptive questionnaire, medication adherence self-efficacy scale, health-promoting lifestyle profile	Intervention group had improved healthy lifestyle behaviors, perception of self-efficacy regarding medication adherence and blood pressures; Greater blood pressure decreased in intervention group;. Chi-square, variance analysis, paired <i>t</i> -test, McNemar test, Cronbach's	Patient education about medication adherence and healthy lifestyle behavior can be effective in blood pressure reduction of hypertensive patients in the primary care setting

					alpha reliability coefficients.	
Chen (2010). Illness perception and adherence to therapeutic regimens among patients with hypertension: A structural modeling approach. International Journal of Nursing Studies	Testing a hypothetical relationship model between illness perception and adherence to prescribed medications and self-management behaviors in hypertension	Quantitative; Cross-sectional, descriptive, correlational design; Level IV; Illness Perception Questionnaire-Revised, Medication Adherence Inventory, Inventory of Adherence to Self-Management	Purposive sample of 355 hypertensive patients; Cardiovascular clinics of three teaching hospitals in Taiwan	Chinese Illness Perception Questionnaire -Revised, Medication Adherence Inventory, The Inventory of Adherence to Self Management,	Suggests that illness identification may affect patient adherence to prescribed medications or indirectly affect patient adherence by control of the disease and cause. Control of the disease had direct effects on adherence to prescribed medications and self-management; PRELIS, $\chi^2$ , root mean square error of approximation, standardized root mean square residual, comparative fit index, Bentler and Bonett's non-normed fit index, Goodness	Generalization limited; Self-reported measure subject to social desirability; results not able to determine the process of self-regulation; Evidence about the role of illness identification in adherence to therapeutic regimens.

					of Fit Index, critical N, Wald test, Lagrange Multiplier test; no outliers evident in analysis	
Bosworth (2008). Take control of your blood pressure study: A multifactorial tailored behavioral and educational intervention for achieving blood pressure control. Patient Education and Counseling	Evaluating how a tailored behavioral intervention improves blood pressure control	Quantitative; Randomized controlled trial; Level II; randomized into four groups then groups were combined as either the control (usual care, home blood pressure monitoring alone) or intervention (tailored behavioral intervention, both tailored behavioral intervention and home blood pressure monitoring)	Subjects identified through a medical electronic database as have a diagnosis of hypertension; 319 adults with hypertension; Southeast United States	All groups were contacted at the 6-month and 24-month post baseline evaluation; Morisky Self-Reported Medication Taking Scale	Feasibility of the phone calls, frequency of topic module activation, at the 6 month preliminary secondary outcomes, intervention group had 9% increase in self-reported medication adherence from baseline while control group only had 1% increase.	Self-reported adherence results might not be representing actual adherence; number of blood pressure medication taken by the participant only known from what the patient states; Potential lack of generalizability because of the population found in the Southeast United States; Recommendations for intervention that might be helpful in addressing adherence.
Subtopic: Blood Pressure Monitoring						

<b>First author, Year, Title, Journal</b>	<b>Purpose</b>	<b>Research Design<sup>1</sup>, Evidence Level<sup>2</sup> &amp; Variables</b>	<b>Sample &amp; Sampling, Setting</b>	<b>Measures &amp; Reliability (if reported)</b>	<b>Results &amp; Analysis Used</b>	<b>Limitations &amp; Usefulness</b>
Costa (2015). Interventional tools to improve medication adherence: review of literature. Patient Preference and Adherence	Review the most commonly used interventions for medication adherence, measured outcomes, and improvements achieved, and look at limitations of the interventions	Review of literature, Level I, variables included interventions including behavioral, educational integrated care, self management, and risk communication. Also included packaging and daily reminders	Numerous different articles in regards to medication adherence	Measures and reliability not noted in the article.	Conclusion made from the articles review by the group. Medication adherence remains a challenge for health care providers, poor adherence can be associated with poor health outcomes, lower QOL, high health care costs. Improving medication adherence dependent on the clinical condition being assessed.	Emphasized different interventions that may show an improvement in patient adherence to treatment/ medications usage. Pointed out limitations in other medication adherence studies
Karakurt (2012). Factors affecting medication adherence in patients with hypertension. Journal of Vascular Nursing	Evaluate reasons why patients may not adhere to medication regimens and factors that affect the use of medications	Descriptive Study; Level VI; sociodemographic characteristics of patients, hypertensive profile, medication status	Convenience sampling; outpatient hypertensive clinic in Turkey; 750 participants	Questionnaire form used to collect data obtained from face-to-face interviews	Descriptive statistics; Chi-square testing for characteristics and adherence	Explained significant influences on medication adherence Interventions that strength patient adherence to

		and factors affecting it				medication and BP control; Instrument used designed specifically for study; participants are only from one clinic
Agarwal (2011). Role of home blood pressure monitoring in overcoming therapeutic inertia and improving hypertension control. Hypertension	Explain how beneficial home monitoring can be on blood pressure reduction	Quantitative; Systematic review and meta-analysis; Level I. Blood pressure monitoring at home, blood pressure monitor at clinic	RCTs evaluating blood pressure monitor at home and clinical blood pressure monitoring	Factors that could improve blood pressure control	Home blood pressure monitoring; random-effects model, I-squared statistic; modified Jadad score, therapeutic inertia, Begg test and funnel plot	Strengthen evidence for home monitoring blood pressure in improving blood pressure control
Ireland (2011). Stroke prevention care delivery: Predictors of risk factor management outcomes. International Journal of Nursing Studies.	Examine how different patient characteristics predict blood pressure control and glucose targets in patients who have had a TIA/stroke and hypertension and/or diabetes	Quantitative, prospective study design. Level II. Participant demographics, cognitive measurements, self-efficacy measurement, social support measurement, depression measurement,	313 referred patients, 93 participants met criteria, 77 participants completed 6-month follow up. Canadian SPC located in an academic teaching hospital and	Mini (MMSE) and Modified Mini-Mental State (3MS) examination, The Trail Making Test (TMT), Clock completion version of Clock drawing test, efficacy	TIA confirmed in 58%, stroke in 42%, mean age 69 years, 53% males, 97% HTN, 25% DM, some had both, 23% not followed up by family practitioners, 97% reported >80% adherence	Small sample size, limited generalizability level of education, cognitive function between those who completed protocol and those who were lost to follow up

		assessment of family physician follow up, physiological & adherence measurements	regional stroke center	beliefs, efficacy outcome expectations, Social Network scale, Geriatric Depression Scale (GDS-15), electronic facsimile, Oxfordshire Stroke Classification System, percentage adherence score	to medications at 6 month follow up, 57% met treatment targets; Logistic regression analysis	
Cappuccio (2004). Blood pressure control by home monitoring: meta-analysis of randomized trials. BMJ	Effect of home blood pressure monitoring on patient achieving target blood pressure	Quantitative; meta-analysis; Level I; intervention and control groups	Randomised controlled trials; Home blood pressure monitoring group vs. control group	Systolic and diastolic blood pressures, mean blood pressure and achieving blood pressure targets	Systolic, diastolic, mean BP lower in patients who did home blood pressure monitoring	Blood pressure can be better controlled with home blood pressure monitoring
Subtopic: Hypertension Management Interventions						
<b>First author, Year, Title, Journal</b>	<b>Purpose</b>	<b>Research Design<sup>1</sup>, Evidence Level<sup>2</sup> &amp; Variables</b>	<b>Sample &amp; Sampling, Setting</b>	<b>Measures &amp; Reliability (if reported)</b>	<b>Results &amp; Analysis Used</b>	<b>Limitations &amp; Usefulness</b>

Community Preventive Service Task Force (2014). Team-based care to improve blood pressure control: Recommendation of the community preventive services task force. Am J Prev Med.	Evaluation of the effectiveness of a team approach to blood pressure control	Quantitative; Systematic Reviews; Level I; assorted variables. National Guideline	NA	NA	Rating scheme for the strength of evidence-scale utilized; Team approach beneficial to address patient's concerns related to HTN	Strengthen recommendation for team approach for BP control; only articles in English considered, did not include secondary hypertension conditions; Expert consensus for formulating the recommendation.
Go (2014). An Effective Approach to High Blood Pressure Control. Hypertension.	Use the principles collected to develop hypertension algorithms that can be utilized in different practices and populations	Quantitative; Information collected from group recommendations; Level I (Recommendations taken from AHA, ACC, CDC); Diverse variables.	NA	NA	Recommendation for high blood pressure control and hypertension treatment algorithm development	Algorithm can be used in a variety of settings and populations.
Subtopic: Nonadherence to Treatment Factors						
<b>First author, Year, Title, Journal</b>	<b>Purpose</b>	<b>Research Design<sup>1</sup>, Evidence Level<sup>2</sup> &amp; Variables</b>	<b>Sample &amp; Sampling, Setting</b>	<b>Measures &amp; Reliability (if reported)</b>	<b>Results &amp; Analysis Used</b>	<b>Limitations &amp; Usefulness</b>

<p>Ahn (2016). Factors associated with medication adherence among medical paid beneficiaries with hypertension. Western Journal of Nursing Research</p>	<p>Determine components of medication adherence in medical-aid beneficiaries with hypertension</p>	<p>Quantitative; Cross-sectional study; Level IV; health literacy scores, self-efficacy, pros-cons of chronic disease management, medication adherence</p>	<p>Convenient sample of 289 patients in South Korea</p>	<p>Study questionnaire; Modified Morisky Scale, rapid estimate of adult literacy in medicine, General self-efficacy questions; pros and cons questions on diet, exercise, and medication adherence</p>	<p>General participant characteristics descriptive analysis on study variables, hierarchical multiple regression analysis for factors associated with medication adherence</p>	<p>Described predisposing factors and enabling factors associated with medication adherence in patients with hypertensive patients</p>
<p>Alhalaiqa (2012). Adherence therapy for medication non-compliant patients with hypertension: A randomized controlled trial. Journal of Human Hypertension</p>	<p>Determine how effective adherence therapy is compared to usual treatment in reducing blood pressure in patients who are noncompliant hypertensive patients</p>	<p>Randomized controlled trial; Level II; variables controlled group (treatment as usual), experimental group (adherence therapy)</p>	<p>136 participants, all over the age of 18 diagnosis of hypertension, currently has elevated blood pressure, and has monthly scheduled follow up appointments; Outpatient clinics in three government</p>	<p>Adherence therapy, Morisky Medication Adherence Scale, Beliefs about Medicines Questionnaire , demographics and patient characteristics ; blood pressure measurements</p>	<p>Adherence therapy group had greater SBP and DBP reduction better recognized benefits of medications and took more of their medications</p>	<p>4 week follow up duration; no significant different in rate of prescribing adjustments; patients were aware that they were being monitored</p>

			hospitals in Jordan	at appointment, pill counting		
Gadkari (2012). Unintentional non-adherence to chronic prescription medications: How unintentional is it really? BMC Health Services Research	Determine how frequent unintentional nonadherence occurs, predictors for nonadherence, relationship of intentional and nonintentional nonadherence related to medication relief	Cross-sectional survey; Level IV. Chronic conditions (HTN, DM, HLD, osteoporosis, depression)	24,017 adults who self-identified themselves as persistent to prescription medications for their disease; conducted via internet	Multi-item scales perceiving needs for medications, perceived medication concerns, perceived medication affordability	Reason for not taking medications included forgetting, running out, carelessness when taking medications; statistically-significant predictors of the three behaviors were identified; mediational tests completed	Low survey contact rate since conducted over the internet, may not reach all populations, participants do not match general population make up, over representation of Caucasians; self-identified participants
Karakurt (2012). Factors affecting medication adherence in patients with hypertension. Journal of Vascular Nursing	Evaluate reasons why patients may not adhere to medication regimens and factors that affect the use of medications	Descriptive Study; Level VI; sociodemographic characteristics of patients, hypertensive profile, medication status and factors affecting it	Convenience sampling; outpatient hypertensive clinic in Turkey; 750 participants	Questionnaire form used to collect data obtained from face-to-face interviews	Descriptive statistics; Chi-square testing for characteristics and adherence	Explained significant influences on medication adherence Interventions that strength patient adherence to medication and BP control; Instrument used designed specifically for study;

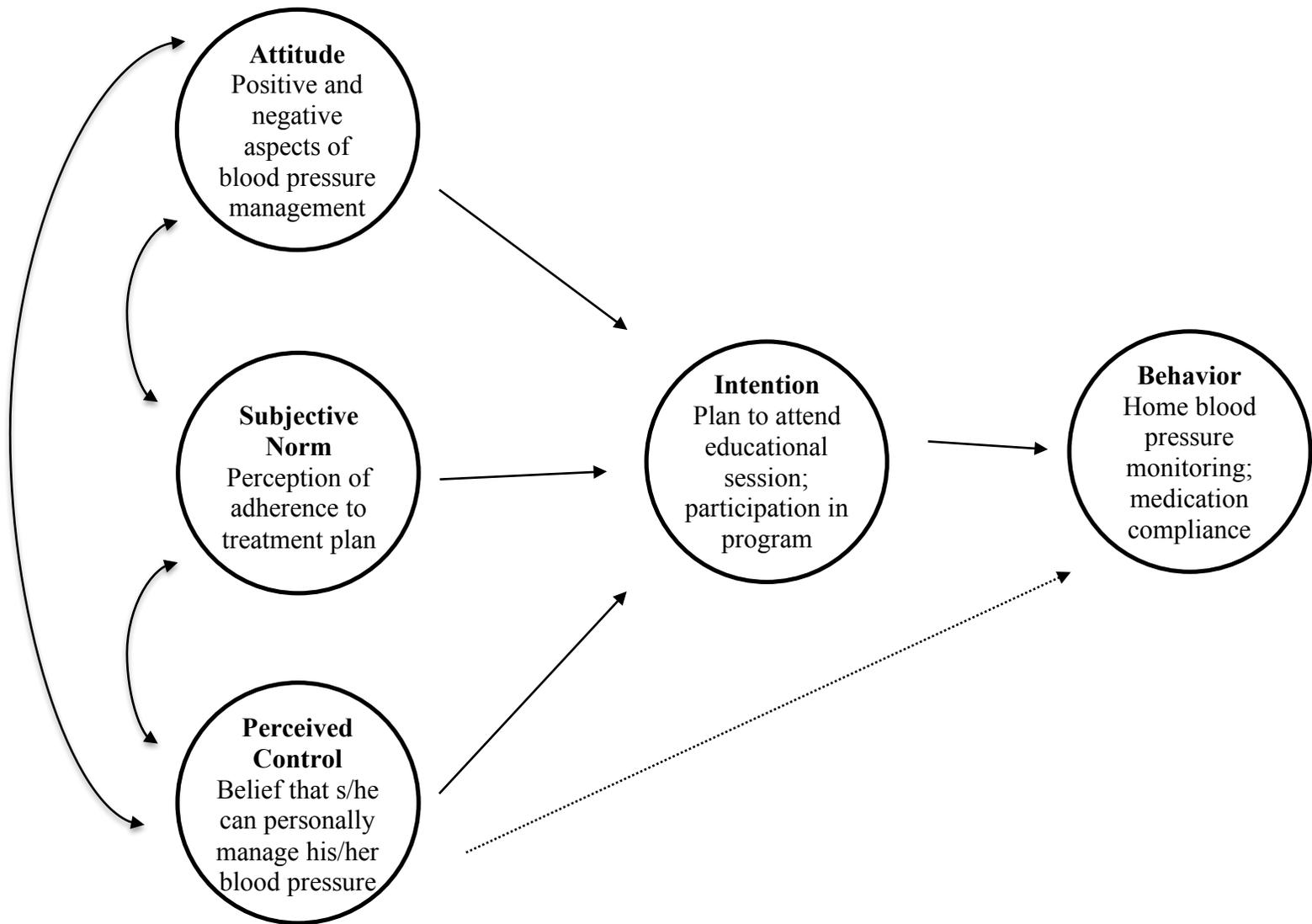
						participants are only from one clinic
Viswanathan (2012). Interventions to Improve Adherence to Self-administered medications for chronic diseases in the United States. Ann Intern Med	Assess how effective patient, provider, system and policy interventions are at improving medication adherence for chronic health conditions	Systematic review. Level I. Variables dependent on trial completed and intervention being evaluated	Randomized controlled trials of patient, provider or systems interventions; nonrandomized studies of policy interventions; 64 trials for patient, provider, systems level interventions, 4 observational studies, 1 trial policy interventions	Identified interventions to improve adherence including how prescription drugs are paid for and covered; systems interventions, patient-level educational interventions with behavioral support	Evidence synthesized for each clinical condition then by type of intervention	Studies limited to adults with chronic condition with some exclusions; Identified possible causes of nonadherence. Recommendation for improving adherence.
Chen (2010). Illness perception and adherence to therapeutic regimens among patients with hypertension: A structural modeling	Testing a hypothetical relationship model between illness perception and adherence to prescribed medications and self-management	Quantitative; Cross-sectional, descriptive, correlational design; Level IV; Illness Perception Questionnaire-Revised,	Purposive sample of 355 hypertensive patients; Cardiovascular clinics of three teaching hospitals in Taiwan	Chinese Illness Perception Questionnaire -Revised, Medication Adherence Inventory, The Inventory	Suggests that illness identification may affect patient adherence to prescribed medications or indirectly affect patient adherence	Generalization limited; Self-reported measure subject to social desirability; results not able to determine the process of self-regulation;

<p>approach. International Journal of Nursing Studies</p>	<p>behaviors in hypertension</p>	<p>Medication Adherence Inventory, Inventory of Adherence to Self-Management</p>		<p>of Adherence to Self Management,</p>	<p>by control of the disease and cause. Control of the disease had direct effects on adherence to prescribed medications and self- management; PRELIS, <math>\chi^2</math>, root mean square error of approximation, standardized root mean square residual, comparative fit index, Bentler and Bonett's non-normed fit index, Goodness of Fit Index, critical N, Wald test, Lagrange Multiplier test; no outliers evident in analysis</p>	<p>Evidence about the role of illness identification in adherence to therapeutic regimens.</p>
<p>Ogedegbe (2004). Barriers and facilitators of medication</p>	<p>Determine perceived barriers and facilitators of</p>	<p>Qualitative study; Level VI. 4 categories of barriers, 5</p>	<p>Purposeful sampling; two urban primary</p>	<p>Data analysis and data collection using</p>	<p>Barriers include patient specific, medication specific, logistic</p>	<p>Patient perspective of barriers and facilitators of</p>

adherence in hypertensive African americans: A qualitative study. Ethnicity & Disease	anti-hypertensive medication adherence in hypertensive African American patients	categories of facilitators	care practices in New York	grounded theory methodology	and disease specific barriers; Facilitators included use of reminders, having a routine, knowledge about hypertension, treatment and complications, social support, good doctor-patient communication; Open coding; ethnograph; break down of generated categories	medication adherence in patients with hypertension identified
Subtopic: Hypertension Treatment						
<b>First author, Year, Title, Journal</b>	<b>Purpose</b>	<b>Research Design<sup>1</sup>, Evidence Level<sup>2</sup> &amp; Variables</b>	<b>Sample &amp; Sampling, Setting</b>	<b>Measures &amp; Reliability (if reported)</b>	<b>Results &amp; Analysis Used</b>	<b>Limitations &amp; Usefulness</b>
Armstrong (2014). JNC 8 guidelines for the management of hypertension in adults. Am Fam Physician	Overview of the recommendations for management of hypertension from JNC 8	Evidence Based Practice Guidelines. Level I	NA	NA	Discussed when to initial pharmacological therapy in patients with CKD, DM; Recommended medication for certain patients	Highlights important blood pressure recommendations made by JNC 8

<p>James (2014). 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC 8). JAMA</p>	<p>Recommendations for management of high blood pressure</p>	<p>Evidence Based Practice Guideline. Level I; variables dependent on RCT reviewed for recommendation.</p>	<p>NA</p>	<p>NA</p>	<p>Recommendations used to manage blood pressure in different populations based on three specific questions being addressed by panel.</p>	<p>Guidance for blood pressure treatment. Focused mainly on RCTs. Treatment adherence and medication cost was not considered. Did not include observational studies, SR, meta-analyses. Panel did not conduct own meta-analysis.</p>
<p>U.S. Preventive Service Task Force (2007). Screening for high blood pressure: U.S. Preventive Service Task Force Reaffirmation Recommendation Statement. Ann Intern Med</p>	<p>Recommendation for high blood pressure screening</p>	<p>Clinical Guideline based on systematic review of evidence; Level I, targeted literature search</p>	<p>Systematic review of evidence</p>	<p>NA</p>	<p>Evidence for treatment of high blood pressure can decrease incidence of cardiovascular events</p>	<p>Reaffirms current recommendations for high blood pressure screening. Suggested resources for blood pressure management</p>

Appendix C. Theory of Planned Behavior



(Adapted from Ajzen, 1991).

Appendix D. Site Approval Letter

Content removed for purpose of de-identification.

## Appendix E. IRB Approval Letters



UMKC  
5319 Rockhill Road  
Kansas City, MO 64110  
TEL: (816) 235-5927  
FAX: (816) 235-5602

**NOTICE OF NEW APPROVAL**

Principal Investigator: Ms. Janet Wood  
6372 S. Farm Rd. 119  
Brookline Station, MO 65619

Protocol Number: 17-232

Protocol Title: Education Utilization in Blood Pressure Management and Medication Adherence in Hypertensive Adults

Type of Review: Designated Review

Expedited Category #: 4, 5, 7

**Date of Approval: 10/15/2017**

**Date of Expiration: 10/14/2018**

Dear Ms. Wood,

The above referenced study, and your participation as a principal investigator, was reviewed and approved, under the applicable IRB regulations at 21 CFR 50 and 56 (FDA) or 45 CFR 46 (OHRP), by the UMKC IRB. You are granted permission to conduct your study as described in your application.

- Your protocol was approved under Expedited Review Regulatory Criteria at 45 CFR 46.110 or 21 CFT 56.110 under Category #4 as follows: Collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. Where medical devices are employed, they must be cleared/approved for marketing.

- Your protocol was approved under Expedited Review Regulatory Criteria at 45 CFR 46.110 or 21 CFT 56.110 under Category #5 as follows: Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis). (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(4). This listing refers only to research that is not exempt.)

- Your protocol was approved under Expedited Review Regulatory Criteria at 45 CFR 46.110 or 21 CFT 56.110 under Category #7 as follows: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

- The IRB reviewed and approved the partial waiver of authorization under Expedited Review as identified above and has determined the alteration or waiver, in whole or in part, of authorization satisfies the criteria under 45 CFR 164.512(i)(2)(ii).

This approval includes the following documents:

**Attachments**

08.07.2017\_PhoneScript

Site\_Approval\_Letter

Endaya\_ApprovalLetter



**UMKC**  
5319 Rockhill Road  
Kansas City, MO 64110  
TEL: (816) 235-5927  
FAX: (816) 235-5602

7.6.17\_Recruitment Flyer  
7.6.17\_RecruitmentPostcard  
Demographics\_Form  
MGL\_Medication\_Adherence\_Tool  
07.26.2017.Proposed\_Protocol\_Ground Rules  
08.07.2017.Follow\_Up\_Call\_Documentation\_Form  
Understanding\_and\_managing\_High BP Education  
Understanding\_and\_Managing\_HighBP\_Presentation  
TMC-Research-Application-Form\_Endaya  
Methods.Endaya  
09.18.17\_Partial-waiver-of-authorization.ENDAYA  
09.18.17\_tmc-authorization-web.ENDAYA  
Recruitment\_MRN\_IDNumbers  
TMC\_Consent\_Barcode\_Endaya- Approved\_Version Date\_10.12.17

If a consent is being used in this research study you may find the stamped version in section 16 of your application.

The ability to conduct this study will expire on or before 10/14/2018 unless a request for continuing review is received and approved. If you intend to continue conduct of this study, it is your responsibility to provide a Continuing Review form prior to the expiration of approval or a final report if you plan to close the study.

This approval is issued under the University of Missouri - Kansas City's Federal Wide Assurance FWA00005427 with the Office for Human Research Protections (OHRP). If you have any questions regarding your obligations under the Board's Assurance, please do not hesitate to contact us.

There are 5 stipulations of approval:

- 1) No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date. (PIs and sponsors are responsible for initiating Continuing Review proceedings).
- 2) All unanticipated or serious adverse events must be reported to the IRB.
- 3) All protocol modifications must be IRB approved prior to implementation unless they are intended to reduce risk. This includes any change of investigator.
- 4) All protocol deviations must be reported to the IRB.
- 5) All recruitment materials and methods must be approved by the IRB prior to being used.

Please contact the Research Compliance Office (email: [umkcirb@umkc.edu](mailto:umkcirb@umkc.edu); phone: (816)235-5927) if you have questions or require further information.

Thank you,

A handwritten signature in black ink, appearing to read "C. Thompson".

Cynthia Thompson



UMKC  
5319 Rockhill Road  
Kansas City, MO 64110  
TEL: (816) 235-5927  
FAX: (816) 235-5602

#### NOTICE OF AMENDMENT APPROVAL

Principal Investigator: Janet Wood, DNP  
6372 S. Farm Rd. 119  
Brookline Station, MO 65619

Protocol Number: 17-232

Protocol Title: Education Utilization in Blood Pressure Management and Medication Adherence in Hypertensive Adults

Type of Review: Designated Review

**Date of Approval: 11/26/2017**

**Date of Expiration: 10/14/2018**

Dear Ms. Wood,

Your request for revision to the research protocol listed above was reviewed by the UMKC IRB.

The requested revision involves:

- Revision to recruitment: Student investigator will view the daily schedule of the clinic to identify potential study participants on clinic days. Healthcare providers of the Blue Clinic will help identify potential participants. This will take place rather than the primary care medicine director creating a chart ticket.

- Education intervention will take place at a site on the hospital hill campus rather than specifically at the Blue clinic, depending on room availability.

- Sections of the application modified include:

Purpose, Study Procedures

Subject Population (g-j)

Subject Compensation and Costs

Risks

Procedures to Maintain Confidentiality

#### **Attachments**

This amendment is consistent with the purposes of the study and will permit the collection of relevant data. This is to confirm that your request for revision was approved and you are granted permission to conduct your study as revised effective immediately.

If a consent is being used in this research study you may find the stamped version in section 16 of your application.

The date for continuing review remains unchanged at 10/14/2018, unless closed before that date.

Please note that any further changes to the study must be promptly reported and approved. Please contact the Research Compliance Office (email: [umkcirb@umkc.edu](mailto:umkcirb@umkc.edu); phone: (816)235-5927) if you have questions or require further information.

Thank you,

A handwritten signature in black ink, appearing to read 'C. Thompson', is written over a light blue horizontal line.

Cynthia Thompson  
UMKC IRB



UMKC  
5319 Rockhill Road  
Kansas City, MO 64110  
TEL: (816) 235-5927  
FAX: (816) 235-5602

### NOTICE OF AMENDMENT APPROVAL

Principal Investigator: Janet Wood, DNP  
6372 S. Farm Rd. 119  
Brookline Station, MO 65619

Protocol Number: 17-232  
Protocol Title: Education Utilization in Blood Pressure Management and Medication Adherence in Hypertensive Adults  
Type of Review: Designated Review

**Date of Approval: 01/04/2018**  
**Date of Expiration: 10/14/2018**

Dear Ms. Wood,

Your request for revision to the research protocol listed above was reviewed by the UMKC IRB.

The requested revision involves:

- Revision to the inclusion criteria: Inclusion criteria will include participants over the age of 60 rather than making 60 the cut off age.
- Sections of the application modified include:

HIPAA

Attachments

Purpose, Study Procedures

Subject Population (a-f)

Consent Background-Informed Consent

**Attachments**

Recruitment Flyer\_Version\_FINAL  
Recruitment\_Postcard\_Version\_FINAL  
Proposed\_Protocol\_Ground Rules.Version\_FINAL  
Methods.Endaya\_Final  
12.19.17\_tmc-authorization-web.ENDAYA  
Partial-waiver-of-authorization.ENDAYA\_FINAL  
TMC\_Consent\_Barcode\_Endaya- Approved\_Version Date\_12.13.17(1)

This amendment is consistent with the purposes of the study and will permit the collection of relevant data. This is to confirm that your request for revision was approved and you are granted permission to conduct your study as revised effective immediately.

If a consent is being used in this research study you may find the stamped version in section 16 of your application.

The date for continuing review remains unchanged at 10/14/2018, unless closed before that date.



**UMKC**  
5319 Rockhill Road  
Kansas City, MO 64110  
TEL: (816) 235-5927  
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Please note that any further changes to the study must be promptly reported and approved. Please contact the Research Compliance Office (email: [umkcirb@umkc.edu](mailto:umkcirb@umkc.edu); phone: (816)235-5927) if you have questions or require further information.

Thank you,

A handwritten signature in black ink, appearing to read "C. Thompson".

Cynthia Thompson  
UMKC IRB



UMKC  
5319 Rockhill Road  
Kansas City, MO 64110  
TEL: (816) 235-5927  
FAX: (816) 235-5602

### NOTICE OF AMENDMENT APPROVAL

Principal Investigator: Janet Wood, DNP  
6372 S. Farm Rd. 119  
Brookline Station, MO 65619

Protocol Number: 17-232  
Protocol Title: Education Utilization in Blood Pressure Management and Medication Adherence in Hypertensive Adults  
Type of Review: Designated Review

**Date of Approval: 01/22/2018**  
**Date of Expiration: 10/14/2018**

Dear Ms. Wood,

Your request for revision to the research protocol listed above was reviewed by the UMKC IRB.

The requested revision involves:

- Changed intervention to a brief one to one interaction in the clinic setting with participants.
- Sections of the application revised include the following: Purpose, Study Procedures, Recruitment 6A, Consent Background and Attachments.

**Attachments**

TMC\_Consent\_Barcode\_Endaya\_Approved\_Version Date\_1.11.2018(4)

This amendment is consistent with the purposes of the study and will permit the collection of relevant data. This is to confirm that your request for revision was approved and you are granted permission to conduct your study as revised effective immediately.

If a consent is being used in this research study you may find the stamped version in section 16 of your application.

The date for continuing review remains unchanged at 10/14/2018, unless closed before that date.

Please note that any further changes to the study must be promptly reported and approved. Please contact the Research Compliance Office (email: [umkcirb@umkc.edu](mailto:umkcirb@umkc.edu); phone: (816)235-5927) if you have questions or require further information.

Thank you,

A handwritten signature in black ink, appearing to read 'C. Thompson', is written over a light blue horizontal line.

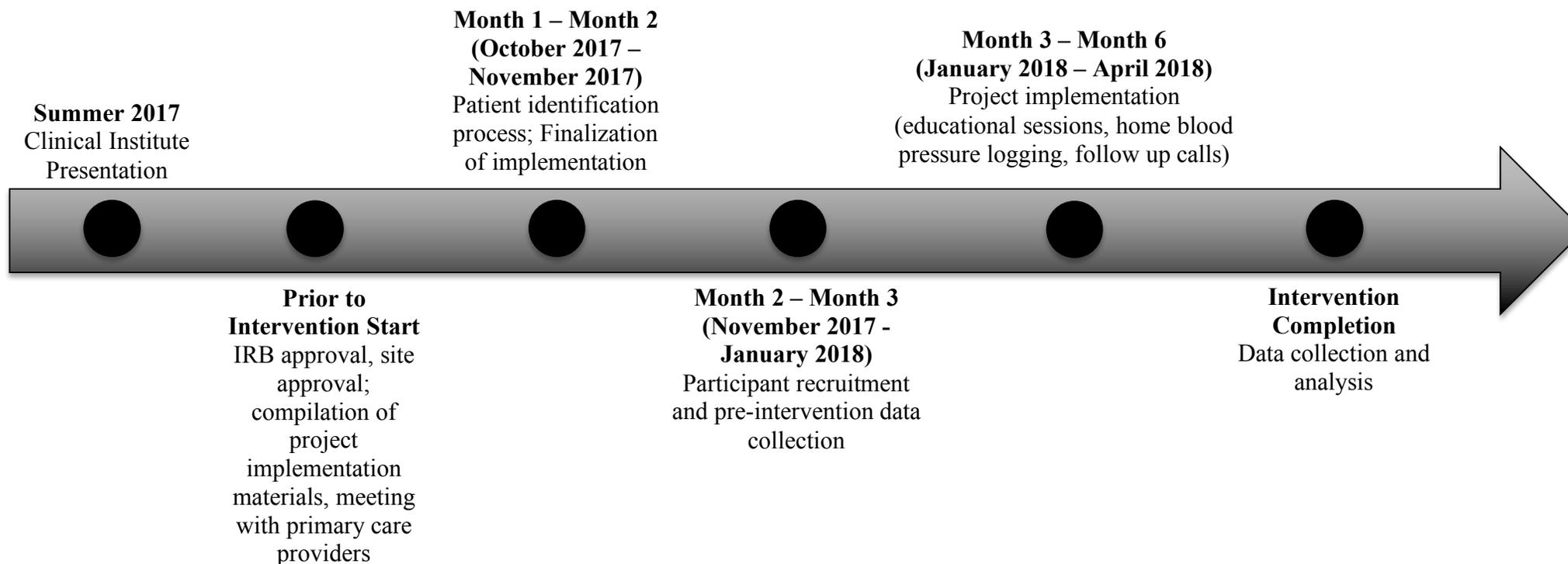
Cynthia Thompson  
UMKC IRB

## Appendix F. Cost Table for DNP Evidence Based Practice Project

Direct Costs	Dollar Amount	Indirect Cost	Dollar Amount
Printing of recruitment flyers (Office Depot)	\$0.09 (B/W flyer) Quantity: 2 flyers Total: \$0.18	4 hours of facility usage at the UMKC School of Medicine: lights, tables, chairs, space, technology equipment, electricity usage	Waivered cost of \$100 as UMKC student
Printing recruitment postcards (Vistaprint)	Quantity: 100 postcards Total: \$17.70	Education session given by student investigator	N/A; student investigator's cost of time
Envelopes for recruitment postcards (Amazon)	50 pack of envelopes Quantity: 2 Total: \$18.74	Follow up phone calls to participants	N/A; student investigator's cost of time
Printing of informed consent forms (Office Depot)	\$0.09 (B/W doc) Quantity : 80 copies (5 pages) Total: \$25.84	Implementation time of project	N/A; student investigator's cost of time
Printing of informed consent forms (Office Depot)	\$0.09 (B/W doc) Quantity: 10 copies (5 pages) Total: \$4.50	Evaluating and analysis study data	N/A; student investigator's cost of time
Printing of HIPAA consent forms (Office Depot)	\$0.12 (B/W doc) Quantity: 80 copies (3 pages) Total: \$28.80		
Printing of demographics forms (Office Depot)	\$0.18 (B/W, double sided doc) Quantity: 40 copies Total: \$7.20		
Printing of adherence scale surveys (Office Depot)	\$0.09 (B/W doc) Quantity: 80 sheets Total: \$7.20		
Printing educational workbooks (Office Depot)	\$2.29 (B/W, double sided booklet) Quantity: 40 booklets Total: \$91.46		
Printing home blood pressure logs (Office Depot)	\$0.09 (B/W doc) Quantity: 40 sheets Total: \$3.60		
Supplies: 10 ct BIC Cristal Black Pens (Wal-Mart)	\$1.57/ package Quantity: 2 packages Total \$3.14		
Beverage: Nestle Pure Life Water (Wal-Mart)	\$3.98/ 35 bottle pack Quantity: 1 package Total: \$3.98		

Total Project Cost: \$ 212.16

Appendix G. Project Timeline Flow Graphic



## Appendix H. Meeting Agenda

**Education Utilization in Blood Pressure Management and Medication Adherence in Hypertensive Adults**

- I. Project overview
- II. Patient Recruitment for Study
  - a. Mailed recruitment postcards to potential participants
  - b. Recruitment flyers
  - c. Potential participants identified by providers
- III. Basic Information Regarding Blood Pressure
  - a. Home blood pressure monitoring of all patients diagnosed with hypertension is recommended by the American Heart Association
  - b. A single low or single high blood pressure reading should not be a cause of alarm
  - c. Blood pressures vary throughout the day
  - d. When there is a low or high blood pressure with symptoms, that is when you want to consider discussion with health care provider
- IV. Low Blood Pressure
  - a. Changes in treatment are not required if results of the systolic blood pressure is less than 140 as long as patient is asymptomatic and there is no adverse effect on the patient's health or quality of life
  - b. Often a low blood pressure may be related to orthostatic hypotension
    - i. Orthostatic hypotension is a systolic blood pressure of 20 mm Hg or a decrease in diastolic blood pressure of 10 mm Hg within three minutes of standing when change from a sitting or lying position

- c. Recommend patient contact their primary care provider at the Blue clinic
  - i. Concern when patient is symptomatic – orthostatic hypotension
  - ii. Symptoms that may be related to blood pressure or medications
    - 1. Dizziness
    - 2. Lightheadedness
    - 3. Blurred vision
    - 4. Weakness
    - 5. Fatigue
    - 6. Nausea
    - 7. Palpitations
    - 8. Headache
    - 9. Syncope
    - 10. Dyspnea
    - 11. Chest pain
    - 12. Neck and shoulder pain

V. High Blood Pressure

- a. Recommend patient contact their primary care provider at the Blue clinic
  - i. If patient has a blood pressure reading of >160 systolic or >100 diastolic two or three readings in a row
  - ii. Symptoms that may be related to blood pressure or medications
    - 1. Fatigue
    - 2. Nausea
    - 3. Shortness of breath

4. Lightheadedness
  5. Headache
  6. Excessive sweating
  7. Problems with your vision
  8. Confusion
- b. Recommend patient seek immediate medical help
- i. If patient has a blood pressure reading of  $>180$  systolic or  $>110$  diastolic AND symptomatic, call 911
  - ii. Hypertensive Urgency
    1.  $>180/110$  after two blood pressure measurements, five minutes apart
    2.  $>180/110$  reading with symptoms
      - a. Severe headache
      - b. Shortness of breath
      - c. Nosebleeds
      - d. Severe anxiety
  - iii. Hypertensive Emergency
    1. Occur when blood pressure levels greater than 180 systolic or 120 diastolic
    2. May have signs of possible organ damage
      - a. Chest pain
      - b. Shortness of breath
      - c. Back pain

- d. Numbness/ weakness
- e. Change in vision
- f. Difficulty speaking

- VI. Provider encounter with patient for concerns regarding blood pressure
  - a. As with all conditions, additional differential diagnoses beyond those related to blood pressure should be considered once discussion with patient and provider has occurred
  - b. Consideration for titration in pharmacologic therapy for symptomatic patients
  - c. Changes in the treatment plan should be individualized for the patient
- VII. Discussion
  - a. Collaborative decision on appropriate blood pressure range
  - b. Collaborative decision on patient instructions regarding blood pressure or medication concerns
  - c. Determine who is responsible for of addressing certain patient concerns

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- American Heart Association. (2016, October). Hypertensive crisis: When you should call 9-1-1 for high blood pressure. Retrieved from [http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/AboutHighBloodPressure/Hypertensive-Crisis\\_UCM\\_301782\\_Article.jsp#.WXdlGYqQyRt](http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/AboutHighBloodPressure/Hypertensive-Crisis_UCM_301782_Article.jsp#.WXdlGYqQyRt)
- American Heart Association. (2016b, October). Monitoring your blood pressure at home. Retrieved from [http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/KnowYourNumbers/Monitoring-Your-Blood-Pressure-at-Home\\_UCM\\_301874\\_Article.jsp#.WUw\\_s8mQyRs](http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/KnowYourNumbers/Monitoring-Your-Blood-Pressure-at-Home_UCM_301874_Article.jsp#.WUw_s8mQyRs)
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- Lanier, J. B., Mote, M. B., & Clay, E. C. (2011). Evaluation and management of orthostatic hypotension. *Am Fam Physician, 84*(5), 527–536.

Appendix I. Recruitment Materials

Recruitment postcard and recruitment flyer removed for purpose of de-identification.

Appendix J. IRB Approved Consent Forms

Content removed for purpose of de-identification.

Appendix K. Intervention Material



# Understanding and Managing High Blood Pressure



# Check. Change. Control.

## What is Blood Pressure?

When your heart pumps blood through the blood vessels, the blood pushes against the walls of your blood vessels. This creates blood pressure. Your body needs blood pressure to move the blood throughout your body, so every part of your body can get the oxygen it needs.

Healthy arteries (the blood vessels that carry oxygen-rich blood from the heart to the rest of the body) are elastic. They can stretch to allow more blood to push through them. How much they stretch depends on how hard the blood pushes against the artery walls.

For your arteries to stay healthy, it's important that your blood pressure be within a healthy range. Fortunately, there are things you can do to help keep your blood pressure in that range. We'll talk about that more later in this guide.

For some people, blood pressure can get too high. This is true for about one-third of American adults (33.0%). This can cause health problems that need to be dealt with as you work with your healthcare provider. We'll talk about this, too, later in the guide.



## Contents

- What is Blood Pressure? ..... 2
- How Blood Pressure is Measured ..... 3
- Know Your Risks ..... 5
- Treatment ..... 8
- Questions to Ask Your Doctor ..... 13
- Managing High Blood Pressure ..... 14



Arbor is a proud sponsor of the American Heart Association/ American Stroke Association's High Blood Pressure Toolkit.

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This workbook is not intended as a substitute for professional medical care. Only your doctor can diagnose and treat a medical problem.



An interactive digital version is available at [heart.org/HBPguide](http://heart.org/HBPguide)

## How Blood Pressure is Measured

How can you tell what your blood pressure is? By using a device called a blood pressure monitor, your healthcare provider can measure your blood pressure to see if it's in a healthy range. You've probably had your blood pressure taken during a visit to your healthcare provider's office.

Your blood pressure is recorded as two numbers. The systolic blood pressure (the "upper" number) tells how much pressure blood is exerting against your artery walls while the heart is pumping blood. The diastolic blood pressure (the "lower" number) tells how much pressure blood is exerting against your artery walls while the heart is resting between beats. Blood pressure is measured in units of millimeters of mercury, or mm Hg. For example, a blood pressure reading might be 120/80 mm Hg.

A healthy blood pressure is under 120/80 mm Hg. A blood pressure reading of 120-139 systolic or 80-89 diastolic is defined as "prehypertension." This means that the blood pressure is not high enough to be called high blood pressure (hypertension), but that it is higher than normal. If systolic blood pressure is 140 or greater, or diastolic blood pressure is 90 or greater, it's high blood pressure.



The table below shows healthy and unhealthy blood pressure ranges as recognized by the American Heart Association:

Blood Pressure Category	Systolic mm Hg (Upper #)		Diastolic mm Hg (Lower #)
Normal	Less than 120	And	Less than 80
Prehypertension	120-139	Or	80-89
High Blood Pressure (Hypertension) Stage 1	140-159	Or	90-99
High Blood Pressure (Hypertension) Stage 2	160 or higher	Or	100 or higher
Hypertensive Crisis (Emergency care needed)	Higher than 180	Or	Higher than 110

## Check. Change. Control.

### Causes of high blood pressure

High blood pressure cannot be cured. It can, however, be managed very effectively through lifestyle changes and, when needed, medication.

In most cases, the cause of high blood pressure is not known. In fact, high blood pressure usually doesn't have symptoms. This is why it is sometimes called "the silent killer."

However, there are known risk factors for high blood pressure. These are conditions that are known to increase the risk for getting high blood pressure. Risk factors fall into two categories: those you can control, and those that are out of your control.

#### Risk factors that are outside of your control

- **Family history:** Just as hair and eye color can run in families, so can high blood pressure. If your parents or other close blood relatives have high blood pressure, there's an increased chance that you'll get it, too. This is why it's important to get your blood pressure checked on a regular basis. The American Heart Association recommends checking at your regular healthcare visit or every two years for people whose blood pressure is in a normal range.
- **Age:** The older you are, the more likely you are to get high blood pressure. As we age, our blood pressures gradually lose some of the elastic quality, which increases blood pressure.
- **Gender:** Until age 54, men are more likely to get high blood pressure than women are. But that changes as we age. From age 55 to 64, men and women get high blood pressure at similar rates. And at 65 and older, women are more likely to get high blood pressure than men are.
- **Race:** African Americans tend to develop high blood pressure more often than Caucasians. For African Americans, high blood pressure also tends to occur at younger ages and to be more severe.

#### Risk factors that you can control

- **Lack of physical activity:** Not getting enough physical activity as part of your lifestyle increases your risk of getting high blood pressure. Physical activity is great for your heart and circulatory system in general, and blood pressure is no exception.
- **An unhealthy diet, especially one high in sodium.** Good nutrition from a variety of sources is critical for your health. A diet that is too high in salt consumption, as

well as calories, saturated fat, and sugar, carries an additional risk of high blood pressure. On the other hand, making healthy food choices can actually help lower blood pressure.

- **Overweight and obesity:** Carrying too much weight puts an extra strain on your heart and circulatory system, and can cause serious health problems. Being overweight increases your risk of cardiovascular disease and diabetes. It also increases your risk of getting high blood pressure.
- **Drinking too much alcohol.** Regular, heavy use of alcohol can cause many health problems, including heart failure, stroke, and irregular heartbeats. Drinking too much alcohol can increase your risk of cancer, obesity, alcoholism, suicide, and accidents. It can also cause your blood pressure to increase dramatically.

In addition to these risk factors, there are others that may contribute to high blood pressure, although how is still uncertain. These include:

- **Smoking and tobacco use:** Using tobacco can cause your blood pressure to temporarily increase and can contribute to damaged arteries, which can make high blood pressure worse.
- **Stress:** Stress is not necessarily a bad thing in and of itself. But too much stress may contribute to increased blood pressure. Also, too much stress can encourage behaviors that increase blood pressure, such as poor diet, physical inactivity, and using tobacco or drinking alcohol more than usual.
- **Sleep apnea:** This is a condition in which some of the tissues in the throat collapse during sleep and block the breathing passageway. In response to that, the brain awakens the sleeper, who then gulps for air in order to open the trachea again. This cycle often repeats many times a night, leading to severe fatigue the following day from a lack of good sleep. Sleep apnea can be a contributing factor to high blood pressure.



## Check. Change. *Control.*

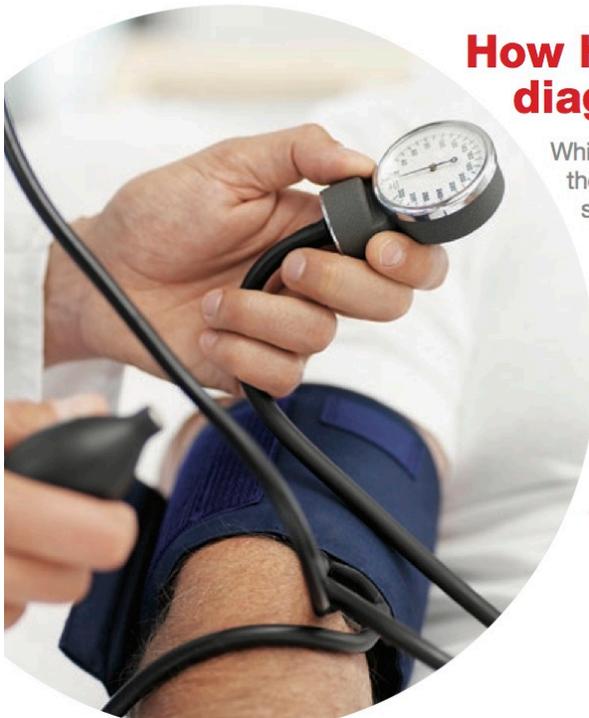
### How high blood pressure affects the body

Left untreated, high blood pressure can have damaging effects on your health. The primary way it causes harm is by increasing the workload of the heart and arteries, which causes damage to the circulatory system over time.

High blood pressure can cause the heart to enlarge because it has to work harder to supply the blood the body needs. It also can contribute to a condition called atherosclerosis, in which the walls of the arteries become stiff and brittle as fatty deposits build up inside them.

Untreated high blood pressure can lead to coronary heart disease, heart failure, heart attack, stroke, kidney damage, angina (chest pain related to heart disease), peripheral artery disease, and other serious conditions.

In fact, people with high blood pressure over 140/90 are far more likely to have these dangerous conditions. According to the American Heart Association, 77% of Americans who've had a first stroke had high blood pressure at or over this level, while the same is true of 69% of Americans who've had a first heart attack. And 74% of Americans who have congestive heart failure have blood pressure levels above 140/90.



### How high blood pressure is diagnosed

While high blood pressure rarely has symptoms, the good news is that it can be diagnosed using a simple test with a blood pressure monitor. Your healthcare provider will perform this test. The most accurate type of monitor is called a bicep cuff monitor. You've probably had this test already, using this device.

To get your blood pressure reading, the cuff is placed around your upper arm and inflated. This temporarily stops the blood flow in the arm. Your healthcare provider then slowly deflates the cuff, observing the reading on the monitor or listening through a stethoscope.

As this happens, your healthcare provider takes note of your systolic and diastolic pressure to determine your blood pressure reading.

Many things can affect blood pressure, so a diagnosis of high blood pressure is usually made after two or more successive readings that exceed healthy blood pressure ranges. Your healthcare provider will test you at least every two years if your blood pressure readings are within healthy ranges, but more often if they're not.

## Monitoring, treating, and managing high blood pressure

If you've been diagnosed with high blood pressure, it's very important to follow the treatment plan your healthcare provider gives you. This will almost certainly include changes to your diet and level of physical activity, and may include medication, too.

### Eating healthy

For people with high blood pressure (and those at risk for it), a healthy diet is a must. There are many healthy diet plans available, but the best for high blood pressure include limiting sodium (salt) intake and including a variety of nutritious foods. One proven diet plan is called the DASH plan (DASH stands for Dietary Approaches to Stop Hypertension).

The DASH plan emphasizes eating plenty of fruits and vegetables, as well as low-fat protein sources (such as skinless poultry, fish, and legumes), low-fat dairy products, and whole grains. It is also low in sugars and red meat, and offers many other nutritional benefits. You can learn more about the DASH plan by visiting the website of the National Heart, Lung, and Blood Institute: [http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new\\_dash.pdf](http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new_dash.pdf).

As for sodium, you'll want to limit your intake to no more than 1,500 mg per day, which is associated with the greatest reduction in blood pressure. How can you tell how much sodium you're eating? By reading food labels. Be careful when you do so—many foods that don't seem to be salt-heavy may contain "hidden" sodium, especially canned foods. Fortunately, food labels give an accurate picture of how much you'll ingest by eating that particular product.



## Check. Change. Control.

### Physical activity

Physical activity is great for everyone. The health benefits of being active are many, and among them are proven benefits to your heart and circulatory system. One of the best ways to manage high blood pressure is to get plenty of physical activity.

Keep in mind that you don't have to be an athlete to get the benefits of physical activity. And you don't even have to get all your daily activity in at one session. In addition to traditional forms of exercise, healthy physical activity can include:

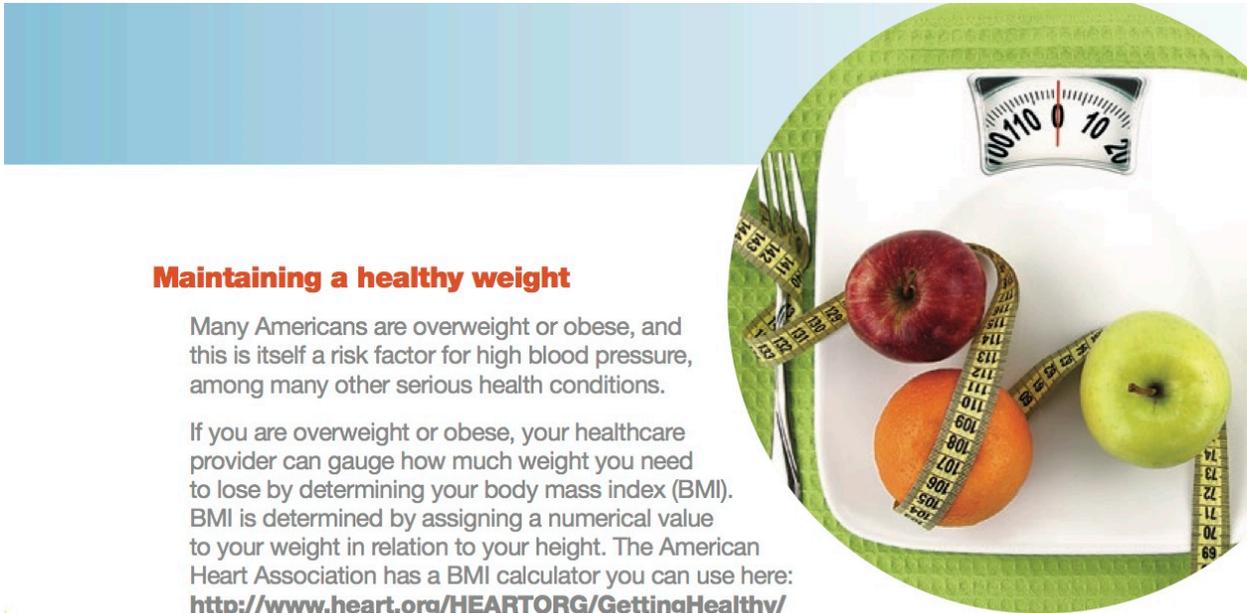
- **Parking farther away from your destination to walk a bit more**
- **Taking the stairs instead of the elevator**
- **Taking your dog out for a stroll**
- **Walking instead of driving**

**To get the greatest benefits from physical activity, the American Heart Association recommends:**

- **Aim for 3 to 4 40-minute sessions per week of moderate-to-vigorous intensity physical activity**
- **Getting at least 10 minutes of physical activity per episode**

It's a good idea to check with your healthcare provider before beginning a physical activity program.





### Maintaining a healthy weight

Many Americans are overweight or obese, and this is itself a risk factor for high blood pressure, among many other serious health conditions.

If you are overweight or obese, your healthcare provider can gauge how much weight you need to lose by determining your body mass index (BMI). BMI is determined by assigning a numerical value to your weight in relation to your height. The American Heart Association has a BMI calculator you can use here: [http://www.heart.org/HEARTORG/GettingHealthy/WeightManagement/BodyMassIndex/Body-Mass-Index-In-Adults-BMI-Calculator-for-Adults\\_UCM\\_307849\\_Article.jsp](http://www.heart.org/HEARTORG/GettingHealthy/WeightManagement/BodyMassIndex/Body-Mass-Index-In-Adults-BMI-Calculator-for-Adults_UCM_307849_Article.jsp).

There's good news here, too. Even losing 3% to 5% of your body weight can bring good health benefits, such as reducing the workload on your heart. Talk with your healthcare provider about the best way to lose weight. The safest way to lose weight is typically to do so a few pounds at a time, by making changes to how many calories you eat and how much physical activity you get. By reducing calories and increasing your physical activity, you're on your way to a healthier weight.

### Reducing stress

Researchers continue to study how stress affects our health, and while we don't know exactly how stress impacts high blood pressure, we do know that it has an effect. Stress makes us more likely to overeat or eat unhealthy foods, drink too much alcohol, smoke (or smoke more than usual), and engage in other risky behaviors that are known to have a bad effect on high blood pressure.

While stress is unavoidable, it can be managed effectively. There are some simple things you can do to reduce the amount of stress you have to deal with. These include:

- **Giving yourself time to get things done.** Overscheduling yourself can increase your stress load.
- **Not overpromising what you can do.** There's nothing wrong with saying "no" if adding one more responsibility would be too much for you.
- **Understanding your stress triggers.** Knowing what causes you to become stressed and taking steps to avoid or manage (when you can't avoid) those triggers can help you control stress.

## Check. Change. Control.

- **Planning to address what you can change, and accepting what you can't change.** No one can do it all. Some things must be dealt with, and it's good to have a plan in place for doing just that. But some things are out of your control. Learn to let those go.
- **Taking time to relax.** There are countless ways to relax, from breathing exercises to getting into a hobby, from sitting in a favorite chair and listening to soothing music to having a chat with a cherished friend. Make sure you make time to relax in a way that is good for you.
- **Building relationships with people who care about you.** We all need friends. Having a support network helps you get through tough times and enjoy good times all the more.
- **Taking care of yourself.** Eating healthy and getting plenty of physical activity has many benefits beyond your physical health—it's great for your emotional and spiritual health, as well. Physical activity is a great stress reducer.



### Limit (or avoid) alcohol

Drinking too much alcohol raises your blood pressure and is a risk factor for many other serious health conditions. If you do drink alcohol, limit your drinking to no more than two drinks per day (for men) or one drink per day (for women). A drink is one 12 oz. beer, 4 oz. of wine, 1.5 oz. of 80-proof spirits, or 1 oz. of 100-proof spirits.

### Avoid or quit tobacco

It's simple: Tobacco is terrible for your health. It is a known risk factor for many potentially deadly diseases, including cancer, heart disease, and lung disease, among many other conditions. Smoking is the single most important preventable cause of premature death in the U.S.

While the exact connection between tobacco and high blood pressure is unclear, we do know that smoking causes blood pressure to temporarily rise. Smoking also contributes to atherosclerosis, the hardening of and buildup of fatty deposits in the arteries. Atherosclerosis can lead to serious conditions of the heart and blood vessels.



If you don't smoke, don't start. If you do smoke, talk with your healthcare provider about ways you can begin to quit. There are medications and programs available to help you, and they have proved effective for many people.

### Home blood pressure monitoring



One way to stay on top of how you're doing in managing your high blood pressure is to use a home blood pressure monitor. This can be a very important tool for you and your healthcare provider to use in getting a "broader" picture of how well you're controlling your high blood pressure. Sometimes, a healthcare provider will even recommend a home blood pressure monitor for people who are at risk for high blood pressure but haven't been diagnosed yet.

Choose a bicep monitor with an appropriately sized cuff, which will give the most accurate readings. Make sure the monitor has been tested and validated. A list of validated monitors is available here: [http://www.dableducational.org/sphygmomanometers/devices\\_2\\_sbp.html#ArmTable](http://www.dableducational.org/sphygmomanometers/devices_2_sbp.html#ArmTable).

Home monitoring can help eliminate false blood pressure readings, which happen when temporary factors affect your blood pressure, and can help give a more reliable picture of how your blood pressure is being managed to you and your healthcare provider.

## Medications

For many people, making changes to diet and lifestyle doesn't do enough to lower blood pressure to a healthy range. Fortunately, there are many medications that can help. They each work in different ways to help lower your blood pressure. Not all blood pressure medications work the same way for everyone, so you and your healthcare provider may need to work together to try different medications until you find the best one for you.

### Other high blood pressure medications

- **Diuretics:** Often the first medication tried with a person newly diagnosed high blood pressure, diuretics work by removing excess salt and water from your body, which is passed through urine. Diuretics are enough for some people, but others need more help to lower blood pressure to a healthy range. In these cases, a healthcare provider may prescribe an additional medication or a medication that contains a diuretic and an additional medication. Diuretics can have side effects. These can include reduced potassium in the body (which can be supplemented), increased blood sugar levels (a potential problem for diabetics), and in some cases, flare-ups of gout or impotence.

## Check. Change. Control.

- **ACE inhibitors:** These medications work by expanding blood vessels and reducing resistance inside them. By doing this, ACE inhibitors allow blood to flow more easily and reduce the workload on the heart. Side effects can include skin rash, loss of taste, and a chronic, dry hacking cough. In rare instances, kidney damage can result. ACE inhibitors should not be taken by pregnant women, and are not recommended for most women of child-bearing age.
- **Angiotensin II receptor antagonists:** These medications stop a hormone called angiotensin II from narrowing the blood vessels. These can cause occasional dizziness. They should not be used in pregnant women.
- **Beta blockers:** These reduce the heart rate and decrease cardiac output, which both help lower blood pressure. Side effects can include insomnia, cold hands or feet, tiredness or depression, asthma symptoms, or a slow heartbeat. For people with diabetes who take insulin, beta blockers have to be monitored carefully. Women receiving beta blockers who are or may become pregnant should consult with their healthcare providers to determine the safest treatment strategy.
- **Calcium channel blockers:** These interrupt the movement of calcium into the heart and blood vessel cells. These can cause palpitations, swollen ankles, constipation, headache, and dizziness. Side effects can vary depending on the specific calcium channel blocker prescribed.
- **Central agonists:** These work by limiting the ability of blood vessels to expand and contract, thus lowering blood pressure. These can cause a rapid drop in blood pressure while standing or moving, which can make you feel weak or faint. They can also cause drowsiness or sluggishness, dry mouth, constipation, fever, or anemia.
- **Peripheral adrenergic inhibitors:** These lower blood pressure by blocking the chemical message the brain sends to the blood vessels to make them constrict. These medications are typically only prescribed if other medications don't help. Stuffy nose, diarrhea, or heartburn can be side effects from this medication.
- **Blood vessel dilators:** These cause the blood vessel walls to relax, which helps them expand more easily and allow blood to flow more freely. These can cause headaches, swelling around the eyes, heart palpitations, or aches and pains in the joints.



## Monitoring blood pressure medications

No matter what blood pressure medication you're prescribed, you will need to work with your healthcare provider to carefully monitor how well the medication is working. It's important to understand that taking blood pressure medication isn't a short-term fix. High blood pressure is a lifelong condition, so taking medication may be a lifelong need. Do not stop taking your medication unless your healthcare provider tells you to do so.

Your healthcare provider may want you to come in for office visits frequently at first to check your blood pressure. Once your blood pressure is under control, you will likely be tested less often.

Another important purpose of careful monitoring is to minimize the impact of side effects. If you're having side effects from the medications you're prescribed, talk with your doctor. A change in dosage or in the type of medication you're taking may be appropriate. Your healthcare provider will work with you to figure out the best changes to make.

## Take medications exactly as prescribed

Your medications are designed to reduce your blood pressure to a healthy range, but they can only work if they're taken exactly as prescribed. This means following the dosage instructions on your medicine bottle to the letter. If you are unsure about how to take your medication, talk with your healthcare provider or pharmacist.

Again, do not stop taking your medication unless you're instructed to do so by your healthcare provider.

If affording your medication is an issue, ask your healthcare provider if a generic medication might be appropriate. These are as effective as name-brand medications and are usually much cheaper. You may also want to look into getting help affording your medications. Visit the Partnership for Prescription Assistance at [www.pparx.org](http://www.pparx.org) or Needy Meds at [www.needymeds.org](http://www.needymeds.org) to learn more.



## Check. Change. Control.

### Living with high blood pressure

High blood pressure is a lifelong condition. Making healthy changes can help control blood pressure, and you should consider eating healthy and getting more physical activity to be lifelong habits.

The same is true of taking medication. Dealing with side effects can be a difficult matter, but it's worth working with your healthcare provider to manage side effects because taking medication can make a huge difference in how well you manage your blood pressure. Controlling your blood pressure means you're lowering your risk for heart disease, heart attack, diabetes, stroke, and kidney disease. Most people who control their high blood pressure are able to live full, healthy lives.

To keep your blood pressure under control, follow these tips:

- Keep your appointments with your healthcare provider.
- Make changes to your diet and physical activity routines lifelong habits. Remember, you don't have to make dramatic changes all at once. Make gradual changes that you're likely to keep pursuing.
- Follow your healthcare provider's advice, including losing weight if recommended.
- Keep your eyes on the prize: better health. By reminding yourself of your goal, you are putting yourself in a position to succeed.





## Track Your Blood Pressure with AHA's CCC Tracker!

You can manage your blood pressure by signing up for AHA's Check. Change. Control.® Tracker. It's a free online tool that allows you to track your blood pressure readings, set up text message reminders and lets you connect with your healthcare provider to share your results. All you'll need is a campaign code to create an account. Go to [ccctracker.com/aha](http://ccctracker.com/aha) and find the campaign code on the map for your state to sign up.



Check.  
Change.  
**Control.**<sup>™</sup>



## **Your Comments and Suggestions are Needed!**

And now, please tell us what you think about this workbook! We need your suggestions to make sure that this has everything you need to know about high blood pressure. Go to our online survey [www.surveymonkey.com/s/AHA\\_HBP](http://www.surveymonkey.com/s/AHA_HBP) and answer just a few questions. It will only take a few minutes of your time. Thank you for your help!



ID # \_\_\_\_\_

**Education Utilization in Blood Pressure Management and Medication Adherence in  
Hypertensive Adults Demographic Form**

1. Please select your gender:
  - a. Male
  - b. Female
  
2. Please select your age group:
  - a. 18 – 44 years old
  - b. 45 – 64 years old
  - c. 65 – 79 years old
  - d.  $\geq$  80 years old
  
3. Please select your race / ethnicity
  - a. White, non-Hispanic
  - b. Black, non-Hispanic
  - c. Hispanic
  - d. Other
  
4. Please select your highest level of education
  - a. < High school diploma
  - b. High school diploma
  - c. Some college
  - d.  $\geq$  College degree
  
5. Please select your insurance or payer source
  - a. Any health insurance
  - b. Self-pay
  - c. Uninsured

6. How many years have you been diagnosed with hypertension?
  - a. Less than 1 year
  - b. 1 – 5 years
  - c. 6 – 10 years
  - d. >10 years
  
7. How many medications do you take for your blood pressure?
  - a. One
  - b. Two
  - c. Three or more
  
8. Do you use tobacco products?
  - a. Never
  - b. In the past
  - c. Current
  
9. Do you drink alcohol products?
  - a. Never
  - b. In the past
  - c. Current

Contact number for follow up call:

---

Choose best time for a follow up call:

- Morning (9 a.m. – 12 p.m.)
- Afternoon (12 p. m. – 4 p.m.)
- Evening (4 p.m. – 7 p.m.)

Preferred e-mail address:

---

ID # \_\_\_\_\_

**Morisky, Green, Levine (MGL) Medication Adherence Scale**

Read the below statements in regards to your medication taking practices. Scores are based on your response to the four yes or no questions.

	Response	
	Yes = 1	No = 0
Do you ever forget to take your medicine?	Yes	No
Are you careless at times about taking your medicine?	Yes	No
When you feel better, do you sometimes stop taking your medicine?	Yes	No
Sometimes if you feel worse when you take the medicine, do you stop taking it?	Yes	No
Total Points		

Scoring  
 0 items = High Adherence  
 1 - 2 items = Medium Adherence  
 3 - 4 items = Low Adherence

Reference

Morisky, D. E., Green, L. W., Levine, D. W. (1986). Concurrent and predictive validity of self-reported measure of medication adherence. *Medical Care*, 24, 67 – 74.

### Home Blood Pressure Monitoring Log

Name \_\_\_\_\_ ID# \_\_\_\_\_

My Blood Pressure Goal \_\_\_\_\_ mmHg

**Instructions**

- Measure your blood pressure twice a day at about the same time - morning and late afternoon- two times a week.
- For best results, sit comfortably with both feet on the floor for at least two minutes before taking a measurement.
- When you measure your blood pressure, rest your arm on a table so the blood pressure cuff is at about the same height as your heart.
- Record your blood pressure on this sheet.

	AM	PM
<b>Week 1</b>		
Day 1		
Day 2		
<b>Week 2</b>		
Day 1		
Day 2		
<b>Week 3</b>		
Day 1		
Day 2		
<b>Week 4</b>		
Day 1		
Day 2		
<b>Week 5</b>		
Day 1		
Day 2		
<b>Week 6</b>		
Day 1		
Day 2		
<b>Week 7</b>		
Day 1		
Day 2		
<b>Week 8</b>		
Day 1		
Day 2		
<b>Week 9</b>		
Day 1		
Day 2		

Adapted from American Heart Association. (2017). *My blood pressure log*. Retrieved from [http://www.heart.org/idc/groups/heart-public/@wcm/@hcm/documents/downloadable/ucm\\_305157.pdf](http://www.heart.org/idc/groups/heart-public/@wcm/@hcm/documents/downloadable/ucm_305157.pdf)



Appendix M. Logic Model

<b>Inquiry, PICOTS:</b> In adults aged 18 years and older diagnosed with hypertension, does a specific educational program about hypertension and at home monitoring follow up by the nurse practitioner student improve blood pressure control and medication adherence over a 3-month period in a primary care clinic?					
<b>Inputs</b>	<b>Intervention(s)</b> <i>Activities</i>	<b>Outputs</b> <i>Participation</i>	<b>Outcomes- Impact</b>		
			<i>Short</i>	<i>Medium</i>	<i>Long</i>
<p><b>Evidence, sub-topics</b></p> <ol style="list-style-type: none"> <li>Hypertension Treatment</li> <li>Blood Pressure Monitoring</li> <li>Hypertension Related Education</li> <li>Nonadherence to Treatment Factors</li> <li>Hypertension Management Interventions</li> <li>Medication Adherence Interventions</li> </ol> <p><b>Major Facilitators or Contributors</b></p> <ol style="list-style-type: none"> <li>EBP practice guidelines for hypertension management</li> <li>National Guideline for screening for blood pressure.</li> <li>Evidence for quality outcomes in patient with controlled blood pressure by utilization of medication adherence interventions</li> </ol> <p><b>Major Barriers or Challenges</b></p> <ol style="list-style-type: none"> <li>Patient buy-in</li> <li>Patient motivation</li> <li>Providing supplies for intervention</li> <li>Provider contribution</li> <li>Implementation Site</li> </ol>	<p><b>EBP intervention which is supported by the evidence in the Input column (brief phrase)</b></p> <p>Hypertension education and awareness of blood pressure utilizing home blood pressure monitoring can help improve the patient’s blood pressure control and adherence to prescribed anti-hypertensive medications.</p> <p><b>Major steps of the intervention (brief phrases)</b></p> <ol style="list-style-type: none"> <li>Obtain IRB and site approval</li> <li>Enroll participants in study</li> <li>Obtain baseline blood pressure values, demographics, survey results</li> <li>Provide educational session about hypertension and hypertension management</li> <li>Follow up call to patients at 2 weeks, 6 weeks and 9 weeks post-education</li> <li>Obtain post-intervention blood pressure, re-administer survey, collect data</li> <li>Analyze obtained data</li> </ol>	<p><b>The participants (subjects)</b></p> <p>Adults aged 18 years and older diagnosed with hypertension who are taking at least one anti-hypertensive medication who meet study criteria.</p> <p>Student Investigator Family practice clinicians</p> <p><b>Site</b></p> <p>Primary care clinic in urban core health system in Missouri.</p> <p><b>Time Frame</b></p> <p>6 months</p> <p><b>Consent or Assent Needed</b></p> <p>Study participants</p> <p><b>Other person(s) collecting data (yes,no):</b> Yes. Student investigator and study participants</p> <p><b>Others directly involved in consent or data collection (yes/no):</b> Yes. Student investigator and study participants</p>	<p><b>Outcome(s) to be measured</b></p> <p>Primary: blood pressure values, survey results</p> <p>Secondary, if applies: Continued blood pressure monitoring; Increased hypertension knowledge</p> <p><b>Measurement tool(s)</b></p> <ol style="list-style-type: none"> <li>Blood pressure cuff values</li> <li>Medication Adherence Scale Survey</li> </ol> <p><b>Statistical analysis to be used</b></p> <ol style="list-style-type: none"> <li>Descriptive statistics</li> <li>Two-tailed, paired sample <i>t</i>-test</li> <li>Two-tailed Wilcoxon Signed Rank Test</li> <li>Independent <i>t</i>-test</li> </ol>	<p><b>Outcomes to be measured</b></p> <p>Controlled post-intervention blood pressure measurement</p> <p>Improved patient adherence to prescribed anti-hypertensive medications</p>	<p><b>Outcomes that are potentials</b></p> <p>Increased anti-hypertensive medication adherence can improve patient long term management of hypertension</p> <p>Improved quality of life, health outcomes, disease management, and decreased health care costs associated with hypertension</p>

## Appendix N. Intervention Participant Flow Diagram

**RECRUITMENT**

- August 2017 – January 2018
- Meeting with clinic providers
- Recruitment flyers posted in clinic.
- Convenience sampling at primary care clinic.
- Daily schedule reviewed for potential participants
- Potential participants invited by student investigator to participate
- Postcard given to potential participants during clinic visit

**CONSENT**

- January 2018
- Consent obtained from patients who are eligible to participate at time of educational session.

**PRE-DATA/TEST**

- January 2018
- Demographic information completed by participant, collected by student investigator.
- Medication Adherence Scale Survey completed by participants, collected by student investigator.
- Student investigator to obtain pre-intervention blood pressures from patient chart.

**INTERVENTION**

- January 2018 – April 2018
- Education session provided to patients by student investigator.
- Participants log their blood pressure measurements for three months.
- Follow up calls from student investigator at two, six, and nine weeks after education intervention.

**POST-DATA/TEST**

- March 2018- April 2018
- Medication Adherence Scale Survey completed by participants, collected by student investigator.
- Home blood pressure monitoring logs collected by student investigator.
- Student investigator to obtain post-intervention blood pressures from patient chart.

Appendix O. Permission for Tool

Personal communication allowing use of standardized tool. Content removed for purpose of de-identification.

Appendix P. Data Collection Template

The screenshot shows the IBM SPSS Statistics Data Editor interface. The main window displays a list of variables in a table format. The table has the following columns: Name, Type, Width, Decimals, Label, Values, Missing, Columns, Align, Measure, and Role. The variables listed are:

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Gender	Numeric	8	2		{1.00, Male}...	None	8	Right	Nominal	Input
2	Age	Numeric	8	3		{1.000, 18 - ...}	None	8	Right	Nominal	Input
3	Race_Ethni...	Numeric	8	2		{1.00, White...}	None	8	Right	Nominal	Input
4	Educationa...	Numeric	8	2		{1.00, < Hig...}	None	8	Right	Nominal	Input
5	Payer_Sourc...	Numeric	8	2		{1.00, Any h...}	None	8	Right	Nominal	Input
6	Duration_of...	Numeric	8	2		{1.00, Less ...}	None	8	Right	Nominal	Input
7	Number_of_...	Numeric	8	2		{1.00, One}...	None	8	Right	Nominal	Input
8	Tobacco_Use	Numeric	8	2		{1.00, Never...}	None	8	Right	Nominal	Input
9	Alcohol_Use	Numeric	8	2		{1.00, Never...}	None	8	Right	Nominal	Input
10	Systolic1_BP	Numeric	8	2		None	None	8	Right	Scale	Input
11	Systolic2_BP	Numeric	8	2		None	None	8	Right	Scale	Input
12	Diastolic1_BP	Numeric	8	2		None	None	8	Right	Scale	Input
13	Diastolic_BP	Numeric	8	2		None	None	8	Right	Ordinal	Input
14	Adherence_1	Numeric	8	2		{1.00, High}...	None	8	Right	Ordinal	Input
15	Adherence_2	Numeric	8	2		{1.00, High}...	None	8	Right	Ordinal	Input
16	FinalBP_Ma...	Numeric	8	2		{1.00, Contr...}	None	8	Right	Nominal	Input
17	Home_BP_...	Numeric	8	2		{.00, Zero d...}	None	8	Right	Scale	Input
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											

The interface also shows a menu bar (File, Edit, View, Data, Transform, Analyze, Direct Marketing, Graphs, Utilities, Extensions, Window, Help) and a toolbar with various icons. At the bottom, there are tabs for 'Data View' and 'Variable View', and a status bar indicating 'IBM SPSS Statistics Processor is ready' and 'Unicode: ON'.

## Appendix Q. Result Tables

Table 1.

*Characteristics of Study Participants*

	Frequency	%
Gender		
Male	1	20
Female	4	80
Total	5	100
Age		
45 – 64 years old	5	100
Race / Ethnicity		
Black, non-Hispanic	5	100
Education Level		
< High school diploma	2	40
Some college	3	60
Insurance / Payor Source		
Any health insurance	5	100
Duration of Hypertension Diagnosis		
1 – 5 years	1	20
6 – 10 years	2	40
> 10 years	2	40
Number of Antihypertensive Medications		
One	1	20
Two	1	20
Three or more	3	60
Total	5	100
Tobacco Use		
In the past	2	40
Current	3	60
Alcohol Use		
In the past	1	20
Current	4	80

*Note:* n = 5

Table 2.

*Collected Participant Data*

	Pre-Intervention			Post-Intervention				
	Systolic	Diastolic	MGL Adherence	Systolic	Diastolic	MGL Adherence	BP Control	Days Logged
Participant 1001	166	90	High	143	88	High	Non-controlled	16
Participant 1002	130	80	Medium	155	79	Medium	Non-controlled	18
Participant 1003	131	88	Medium	-	-	-	-	-
Participant 1004	187	98	Medium	-	-	-	-	-
Participant 1005	142	75	High	-	-	-	-	-

*Note.* MGL = Morisky, Green, Levine Adherence Scale, high, medium, low adherence; BP = Blood Pressure; - Missing Data

Appendix R. UMKC SONHS Proposal Approval Letter



July 26, 2017

Members of Institutional Review Board  
University of Missouri-Kansas City  
Kansas City, Missouri

IRB Members,

This letter serves to provide documentation regarding Jessamine Endaya's Doctor of Nursing Practice (DNP) project proposal. Ms. Endaya obtained approval for her project proposal, *Education Utilization in Blood Pressure Management and Medication Adherence in Hypertensive Adults* from the School of Nursing DNP faculty committee on July 26, 2017.

If I can provide any further information, please feel free to contact me.

Sincerely,

A handwritten signature in cursive script that reads "Susan J. Kimble". The signature is written in black ink and is contained within a thin black rectangular border.

Susan J. Kimble, DNP, RN, ANP-BC, FAANP  
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DNP Programs Director  
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