Improving Adherence to Antihypertensive Regimen Using the SIMPLE Method

A Pilot Study

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Abstract

Societal and personal burden associated with nonadherence to provider prescribed antihypertensive regimen challenges both patient and providers to explore methods to improve adherence. Nonadherence to antihypertensive therapy severely underscores the efficacy of treatment making it a serious issue in population health both from the quality of life and from health economics standpoint. In this quasi-experimental study, the effect of 10 minutes of structured education on improving adherence to antihypertensive therapy among adults with primary uncontrolled hypertension at a rural primary care clinic in Missouri was studied. Education was delivered using the SIMPLE method and the study occurred over 6 month period. The SIMPLE mnemonic stands for simplifying the treatment regimen, impartation of knowledge through education, modification of patients' beliefs, provision of open communication, leaving biases behind, and evaluating adherence using a valid adherence measurement tools. Level of adherence to antihypertensive regimen was measured using the Hill Bone Compliance to High Blood Pressure Therapy Scale (HCHTS). Six participants, three Caucasian males and females participated in the evidence based project. Pre and post intervention blood pressure values were collected and analyzed using paired *t* test, Wilcoxon signed rank test, and percentages. Thirty three percent of the participants experienced a reduction in their Blood Pressure (BP) values and met their target BP ranges at 3 and 6 months post intervention. Participants received structured education on the importance of adherence and the trajectory of hypertension which will assist them in the lifelong self-management of their disease.

Keyword: antihypertensive, nonadherence, hill bone compliance scale, health belief model

Evidence Based Project Proposal

The diagnosis of hypertension (HTN) requires that patients make life style modifications in food, exercise, and adherence to prescribed medications; however, some patients' adherence to anti-hypertensive regimen does not meet their provider's recommendation (Solomon et al., 2015). Adherence is the degree to which a patient's behavior such as taking medications, following a recommended diet, and modifying lifestyle parallels with the provider's prescription (Rimando, 2013). Patients' poor adherence to antihypertensive regimen presents challenges to successful treatment of hypertension and increases the susceptibility to development of preventable complications (Solomon et al., 2015). Nonadherence to medications for management of HTN severely underscores the effectiveness of treatment and may contribute to HTN as serious population health issue affecting the patients' quality of life and imposing a national economic burden (World Health Organization [WHO], 2003). Therefore, interventions directed at improving adherence to hypertension medication would provide a substantial benefit by preventing development of complications which include renal failure, blindness, stroke, cardiac disease, and death (WHO, 2003).

Significance and Economic Policy

Nonadherence to medication is a worldwide health problem averaging about 50% among those with chronic illnesses (WHO, 2003). In the United States, nonadherence to medication costs $284 to $634 per year per adult depending on the geographic area and disease condition (Nasseh, 2012). In 2010, the direct cost of nonadherence to HTN, diabetes and hyperlipidemia medications was $105.8 billion (Nasseh, 2012). In the United States about 59% of patients with hypertension are not adherent to treatment regimen (United States Department of Health and Human Services [USDHHS], 2015).

Local Issue

Most patients with hypertension who are seen at the project site do not consistently meet the Joint National Commission 8 (JNC 8) recommended target range for their blood pressure. No standard protocol or avenue exit to further explore the reasons for patients' noncompliance. Additionally, there is a lack of structured hypertension and medication education for patients who consistently fail to meet the recommended blood pressure (BP) target at the project site. This project was aimed at providing evidence based structured education to increase adherence to antihypertensive regimen, and empowering patients to be partners in their care, therefore leading to improved patient outcome.

Diversity

Harrisonville is a city in Cass county Missouri with a population of 9,983, in 2015 comprised of 95% Caucasian with less than 1% of African Americans, Hispanics and American Indians (United States Census Bureau (USCB), 2014). About 36.37% of the citizens of Harrisonville are religious; in 2015, 6.33% were Catholic; 0.36%, Latter Day Saints, and 3.40% claim to be of other Christian faith (City data, 2015). Harrisonville is not ethnically diverse (City data, 2015).

Problem and Policy

Problem Statement

Hypertension is a chronic disease which cannot be cured but can be managed by following treatment recommendations (Center for Disease Center [CDC], 2014). Poorly controlled hypertension predisposes the patient to cardiovascular diseases, stroke, kidney failure, and death (CDC, 2014). Adherence to the treatment regimen is important in hypertension

management (Mugwano et al., 2016). Nonadherence to hypertensive medication increases a patient's risk of death by up to 80% (USDHHS, 2015).

Intended Improvement with Purpose

Interventions directed at improving adherence to antihypertensive medications would provide a substantial benefit by preventing development of complications (WHO, 2003). Poor adherence is attributed to lack of adequate knowledge of disease course, complications, and medication management; and lack of adherence remains a challenge to the healthcare community (Mugwano et al., 2016). Therefore, to overcome the issue of poor adherence, healthcare professionals' need to empower patients with skills through the provision of education so that patients are better equipped to manage this chronic deadly condition (Mugwano et al., 2016). According to Rimando (2013), patients need education on self-management techniques, empowerment, and motivation through continuous support in order to improve adherence to HTN regimen. The aim of this project is to empower patients with knowledge through the provision of structured evidence based education using the SIMPLE method so they can better manage their HTN as they develop self-efficacy. This will foster an increase in adherence, achievement of recommended BP target per JNC 8 guideline, and prevention of secondary complications of hypertension.

Facilitators and Barriers

The main facilitator and support system to the implementation of this project was the student investigator's preceptor at the clinical site and the research evidence that support the impact of education on adherence (Hosseininasab et al. 2014; Morgado, Rolo, & Castelo-Branco, 2011; Roumie et al. 2006; Stewart et al. 2014; Wang et al. 2011). Other facilitators include adherence to facilities operating standard including the mission, vision and goals (Khalid, &

Nyvang, 2014). According to Rogers's innovation theory, people accept change when they are partners in the change process (Lee & Shih, 2009). Inclusion of the front line staff in the project may have fostered acceptance. Sustainability of the change will be dependent on the positive results, feasibility of the project, and constant communication with stakeholders (Rosswurm & Larrabee, 1999). Favorable results provide support and evidence for the incorporation of the new practice into standards of care with support from stakeholders.

Some of the foreseen barriers to implementation of the project included patients' unwillingness to participate in the evidence based practice (EBP) projects. However, patients were provided with information to ensure informed decision making. Another barrier was inadequate time to conduct patient education in the outpatient setting because patient consultation time with the provider is tightly managed. The brief office visit posed a major obstacle in achieving the 10 minutes structured educational session. Another barrier that may inhibit sustainability of the project could be failure of stakeholders to appoint a project coordinator who will monitor compliance and sustainability after completion of the project.

Review of the Evidence

PICOT

In adults with primary hypertension does providing a 10 minute structured education session using the SIMPLE method improve adherence to antihypertensive regimen and achievement of blood pressure target range per JNC 8 guideline within 6 months in a rural primary care clinic in Missouri.

Search Strategies

To identify evidence to address the inquiry, a PubMed search for studies published from 2005 to 2016 using the search words, role of education, adherence, and antihypertensive regimen

yielded 40 publications. Eight out of the 40 were clinical trials, seven were systematic reviews, and two were cohort studies. The remainders of the publication were 15 qualitative studies, five integrative reviews and two case studies. Search of the Cochrane Library for studies published from 2005 to 2016 using the key words adherence, antihypertensive, medication and patient education yielded 75 results, of which 68 were clinical trials, four were integrative reviews, one was a systematic review and two were cost effectiveness analysis studies. A search of the Cumulative Index to Nursing and Allied Health Literature (CINAHL) for studies published from 2006 to 2016 using the search words of medication adherence, antihypertensive, and patient education yielded 83 results. For direct evidence application to this project, only twenty of the studies were included which were three systematic reviews (level l evidence), 16 randomized clinical trial (level l l), and one cohort study (level 1V). In addition, other credible organizations and government websites such as the CDC, WHO, USDHHS were assessed and relevant information was used.

Evidence

Education and Support

According to the Million Heart Program ® (2013), effective hypertensive therapy prescribed by a competent and knowledgeable provider to control hypertension will only work if taken as prescribed by the patient; therefore, patients need education and motivation to continuously be adherent to prescribed treatment. The review of evidence did support that providing intervention in the form of patient education has the prospect of improving adherence to antihypertensive medication (Hosseininasab et al. 2014; Morgado, Rolo, & Castelo-Branco, 2011; Roumie et al. 2006; Stewart et al. 2014; Wang et al. 2011), see Appendix A for synthesizes of evidence. However some of the studies did show that multifactorial interventions

were superior in improving adherence to medication and lowering overall BP in patients with hypertension compared to education alone (Bosworth et al., 2009; Cheema, Sutcliffe, & Singer, 2014; Pladevall et al.,; 2010 Pouchain et al., 2013). Healthcare providers have the distinctive and essential role of providing patients with the tools they need to be partners in their health care (American College of Preventive Medicine [ACPM], 2011). Many of the studies showed that patients who are equipped with knowledge of the hypertension trajectory, usefulness of medication, and who were closely followed up were more empowered and participatory in their care (Saleem et al., 2015). Also, these patients were more adherent to their treatment regimen and achieved their provider recommended blood pressure target (Roumie et al., 2006; Saleem et al., 2015).

Adherence to medication entails that patients believe there is a substantial benefit to the medicine being prescribed and accept responsibility to adhere to provider recommended instructions (ACPM, 2011), Studies have shown that providers who use a multidimensional approach to medication adherence, which includes improved patient and provider communication and relationship, help their patients achieve high level of adherence (WHO, 2003). Although trust building is a skill that takes time to develop and successful two way open patient communications may be time consuming in a primary care setting, investing in both has a substantial gain for the patient and provider in improving adherence to medications (ACPM, 2011). Continuous progress is achieved when patients have both trust and positive experience with the healthcare professionals and with the care outcome (USDHHS, Million Heart Program ® 2013).

Lifestyle Modification

Education on medication adherence and life style modification increases adherence to hypertensive regimen (Golshahi, Ahmadzadeh, Sadeghi, Mohammadabad, & Pourmoghaddas, 2015). In a randomized control trial, study participants in the intervention group who received education on life style modification and importance of medication adherence had a significant reduction in systolic blood pressure (SBP, $p = 0.004$) and a significant reduction in diastolic blood pressure (DBP, $p = 0.001$) because of increased adherence to medication and changes in lifestyle in areas of diet and exercise (Golshahi et al., 2015). Although the researchers collected information on hypertension knowledge and drug adherence through direct interviewing of participants and without the use of a valid adherence tool, the strength of this study lies in the high number of 180 participants and length of study time (Golshahi et al., 2015).

Culturally Tailored Education

Culture and ethnicity are among the factors that influence adherence to high blood pressure management regimen (WHO, 2003), and incorporating culturally tailored hypertension education management is of equal importance in assisting patients from diverse cultural background and ethnicity to acquire knowledge and manage their condition (WHO, 2003). Holmes et al. (2012) found that African Americans followed by Hispanic have the lowest odds of adherence to hypertension regimen compared to Caucasians. Therefore, culturally tailored educational interventions have been found to improve adherence to hypertension medication among persons with HTN who are of African descent (Beune et al., 2014; Meinema et al., 2015). In management of hypertension, patients are their main caregivers while the health care providers have the essential role of teaching and supporting patients in self-management of their disease condition (Beune et al., 2014). Health care professional need to understand how patients'

beliefs about hypertension affect health behavior and the cultural barriers faced by patients as they struggle with BP control and adherence to therapy (Beune et al., 2014). Addressing these barriers through a culturally tailored education has the prospect of improving adherence to treatment and leading to better BP control (Beune et al., 2014).

Multidimensional Intervention

According to WHO (2003), the causes of nonadherence to antihypertensive are multifactorial and include age, gender, ethnicity, socioeconomic status, severity of illness, number of daily medications, and lack of knowledge of usefulness of medication and comorbidities. The first important initiative in addressing nonadherence is the establishment of collaboration between health care practitioners and patients with the ultimate goal of increasing adherence and achieving the best health outcomes for the patients (ACPM, 2011). Cheema, Sutcliffe, and Singer (2014) conducted a systematic review and meta-analysis of randomized controlled trial that studied the influence of pharmacy led interventions on blood pressure control in patients with hypertension. The analysis found that the pharmacist led educational interventions for patients with hypertension was associated with significant reductions of 6.1 mmHg in SBP in 11 studies that involved 2,240 patients ($p < 0.00001$, Cl 95%) and 2.5 mmHg reduction in DBP in studies that involved 2,246 patients ($p < 0.00001$, Cl 95%). According to the researchers, patients' education alone was unsuccessful in improving adherence in certain situations, but addressing each patient's unique challenge and barriers to adherence was superior to education alone in improving adherence.

Evidence Based Tool, the SIMPLE method

The SIMPLE method (see Appendix B for the SIMPLE tool) was developed by Atreja, Bellam and Levy in 2005. The mnemonic stands for Simplifying the treatment regimen,

knowledge Impartation through education, Modification of patients' beliefs, building trust through the Provision of open communication, doing away with bias by Leaving it behind, and Evaluating adherence using a valid adherence measurement tools. The SIMPLE method offers Health care providers the tool to base and modify their intervention in order to enhance patients' adherence to high blood pressure treatment regimen (Atreja et al., 2005). Improving medication adherence can be viewed by those not affected as a simple task, but for the patients affected, this is a complex task with many competing life factors (ACPM, 2011). Studies have shown that the SIMPLE interventions which encompasses a multifactorial approach are the most effective in fostering medication adherence (Atreja et al., 2005).

According to USDHHS Million Heart Program ® (2013), a multifactorial intervention is more effective than any single intervention in increasing adherence to a high blood pressure treatment regimen The use of the SIMPLE tool by pharmacists and nurses in face-to-face settings has been shown to be effective in improving adherence as it addresses causes of nonadherence (ACPM, 2011). The effectiveness of the SIMPLE tool can be enhanced by the use of valid data to measure adherence on a regular bases, and in some cases, mere simplification of medication regimen was effective in improving adherence (USDHHS, Million Hearts Program ®, 2013).

The Health Belief Model

The Health Belief Model (HBM) was developed in the 1950s by the United States Public Health Services (Jones et al., 2014). Although the primary focus of HBM was on health promotion, it is applicable in varied health related behaviors (Jones et al., 2014) and will be used as a theoretical framework for improving adherence in this project. Because the causes of nonadherence to prescribed antihypertensive are linked to patients behaviors (WHO, 2013), behavioral model such as the HBM offers healthcare professional a deeper understanding of the

correlation between patients' beliefs and nonadherence to prescribed regimen (Aki et al., 2014). The effectiveness of HBM in predicting and describing health care related behavior was well documented in two meta-analyses (Carpenter, 2010; Harrison, Mullen, & Green, 1992). Both meta-analyses concluded that perceived barriers and benefits are the constructs of HBM with the prospect of predicting health related behavior. According to the HBM, an individual's choice of health related action is dependent on perceived benefit of the action and barriers (Finfgeld et al., 2003). The Health Belief Model originally had four constructs: perceived susceptibility, perceived severity, perceived barrier, and perceived benefit (Jones et al., 2014). Two constructs, cue to action and self-efficacy were later added in the 1980's as the model evolved (Jones et al., 2014). The Health Belief Model is easy to implement; however, the major limitation to the use of this model is that it presumes the acceptance of a particular set of values and it is time bound (Finfgeld et al., 2003). Additionally, the model does not consider the influential role emotions has on healthcare related behavior (Finfgeld et al., 2003).

Methods

Institutional Review Board (IRB) and Site Approval

The Primary IRB for this project was University of Missouri Kansas City. The minimal risk of harm with this project was the breach of confidentiality. Approval to conduct the project at the project site was obtained from the student investigators preceptor.

Funding

The cost for implementing and disseminating this project was $450 and included in the total cost were supplies, materials, printing, copying and transportation to conference for dissemination (see Appendix C for cost of project). The student investigator obtained funding from the University of Missouri Graduate Women Council fund.

Ethical Issues

The advocacy role of the student investigator included the safeguarding of patient autonomy, which prioritizes voluntary choice without coercion or fear of retribution, and provision of information needed to make informed choice or consent (Ridley, 2009). To protect patient's privacy while also maintaining confidentiality, data collected and reported was de-identified and there was no research conflict of interest.

Setting and Participants

The setting for the project was an outpatient primary care clinic in rural Missouri. Inclusion criteria were adults with diagnosis of primary hypertension with uncontrolled hypertension and who consistently over the clinic visits did not meet the target BP as stipulated by the JNC 8 guideline. Exclusion criteria included patients with controlled hypertension and those with hypertension not classified as primary. After initial entry into the study, an adherence measurement tool was administered and the patients with scores indicating nonadherence to the recommended hypertension regimen continued in the study. The estimated sample size was 30 to 40 (see Appendix D for Logic Model).

Evidence Based Practice Intervention

The SIMPLE method is the most effective in fostering medication adherence (Atreja et al., 2005). The SIMPLE tool was utilized in the administration of individualized education to participants. Education was tailored to patients needs based on response on adherence measurement tool.

Recruitment of participants commenced during the last week of August 2016, (see Appendix E, for recruitment script). The student investigator recruited potential participants during clinic appointments and provided participants with information on the project (see

Appendix F for Intervention flow diagram). The student investigator coded the participants and obtained data of BP from the electronic medical record. Each participants then completed the HCHTS which the student investigator used to address adherence and BP was measured. Participants whose responses to the HCHTS indicated nonadherence continued in the study and received 10 minutes of structured education using the SIMPLE method. The education was provided by student investigator during the current clinic appointment. Upon return to the clinic, adherence to antihypertensive regimen and BP were measured by the student investigator at intervals of 3 and 6 months. The de-identified data was entered into an electronic spreadsheet and then into a secured database REDCap. After placement into REDCap, the electronic spreadsheet was destroyed (see Appendix G for project time flow).

Rosswurm and Larrabee Evidence Based Practice Model Change

Rosswurm and Larrabee's evidence based practice model developed in 1999 was chosen to guide the evidence based process of this project. The model has six stages which are (1) assess the need for change, (2) link problem with interventions and outcomes, (3) synthesize best evidence, (4) design practice change (5) implement and evaluate change in practice, and (6) integrate and maintain practice change (Rosswurm & Larrabee, 1999). The model content is applicable and suitable for EBP change in outpatient settings (Pipe, 2007).

Change Model

The change model chosen to guide the implementation of this project was the Precaution Adoption Process Model (PAPM) developed by Weinstein in 1988. The PAPM conceptualizes behavior as dynamic process based on stages of change (Minchew, 2015). The model has seven stages of change (see Appendix H for PAPM model): (1) lack of awareness, (2) awareness stage, (3) deliberation on taking action, (4) the individual may decide not to act, (5) decides to act, (6)

actual, and (7) maintenance (USDHHS, 2005). The PAPM calls on practitioners to develop intervention strategies that take into account the stages that pave the way for active decision-making (USDHHS, 2005).

Study Design

The study was a quasi-experimental quality improvement project, specifically interrupted time-series with pre and post intervention with one cohort. Interrupted time-series design has the advantage of multiple measurements of both the pre and post intervention making it easier to address and control for confounding variable (Harris et al., 2006). The aim of this quasi experimental project was to demonstrate causality between SIMPLE intervention and adherence to antihypertensive treatment regimen and controlled BP. The pre-intervention measurements for the project included measuring medication adherence using HCHTS and previous clinic BP readings. The post-intervention measurements included measuring adherence and BP at 3 and 6 months.

Validity

The use of a valid adherence measurement tool HCHTS (Kim, Hill, Bone, & Levine, 2000), structured education using the SIMPLE method, and the use of multidimensional approach (Bosworth et al., 2009; Cheema, Sutcliffe, & Singer, 2014; Pladevall et al., 2010; Pouchain et al., 2013) increased the internal validity of this project. Threats to external validity included low participant number, participants' unwillingness to complete study, and participants continued nonadherence to treatment regimen even after receiving structured education. Another threat to validity was the inability to appropriately control confounding variables due to the lack of randomization; however, this was overcome with interrupted time-series design, although recruitment of a sample size reflecting a power of .8 with medium effect and alpha .05 was not

achieved in the project. In the project proposal, the anticipated sample size and homogeneity of the sample strengthened the external validity for transferability of the study results and intervention to like settings (Harris et al., 2006).

Outcomes of Measure

The primary outcome measure was improved adherence to antihypertensive regimen based on participants' responses on the HCHTS, and the secondary outcome measure was the post intervention mean BP values that meet the target range per JNC 8 guidelines and the measure of change from pre to post values. Because the target BP values vary for different individuals based on age and comorbidities, target BP for individuals was determined based on JNC 8.

Measurement Instruments

Level of adherence to antihypertensive regimen was measured using the HCHTS (see Appendix I for measurement tool) while blood pressure will be measured using the clinic Blood pressure monitor, the Welch Allyn® monitor. The Hill Bone compliance to high blood pressure treatment scale is composed of 14 items with a Likert four point response; (4) all the time, (3) most of time, (2) some of time, and (1) never. The total score ranges from a minimum of 14 to a maximum of 56 (Kim et al., 2000). The sodium subscale contains three items which assesses intake of salty foods, keeping appointment subscale contains three items which assesses appointments for provider visits and prescription refills, and the medication taking subscale contains eight items which assesses medication taking behavior (Kim et al., 2000).

The validity of HCHTS has been addressed by researchers and the tool was found to be valid. Kim et al. (2000) assessed the suitability and validity of the HCHTS with focus on low literacy and cultural sensitivity among hypertensive adult patients in the community care setting

enrolled in hypertension care and controlled clinical trials. The reviewers found that the alphas for the total scale were 0.74 and 0.84, and the average inter item correlations of the 14 items were 0.18 and 0.28. In a review by Lavsa, Holzworth, & Ansani, (2011), the researchers assessed the validity and internal consistency of the HCHTS among adult hypertensive patients attending a community internal medicine clinic, and the reviewers reported an internal consistency reliability alpha of 0.68. However, there were some limitations to the use of the scale and generalization across diverse patient population made the scale only relevant in cardiovascular conditions (Lavsa et al., 2011).

The WelchAllyn Vital Signs monitor is a non-invasive blood pressure monitor that utilizes the oscillometric technology to measure blood pressure and is widely used in hospitals and outpatient settings because of the accuracy of the monitor, and pulse and temperature are also measured (Jones, Taylor, Poston, & Shennan, 2001). In order to test the validity of the WelchAllyn Vital sign monitor, Jones et al. (2001) conducted a study comparing the BP readings from the WelchAllyn reading with that of mercury sphygmomanometer. The study results showed the Welch Allyn monitor to be precise in measurement both for systolic and diastolic blood pressure over a wide range of readings in the adult population. The monitor achieved a grade A rating (highest grade) at most levels and was recommended for use in clinical setting (Jones et al., 2001).

Quality of Data

The estimated number of participants for the study was 30 to 40 adults with uncontrolled hypertension due to nonadherence to treatment regimen. The estimated sample size was not met, seven participants were recruited and six completed the study. To further promote the quality of data, the pre and post intervention BP values were compared and analyzed. Results from

systematic reviews (Cheema, 2014; Gwadry-Sridhar, 2013; Viswanathan, 2012) were used as the benchmark for the quality of the data (see Appendix J for data collection template).

Analysis Plan

The statistical analyses used to draw inference from the data in this quasi experimental project were independent paired *t*-tests and Wilcoxon signed rank test (see Appendix K for definition of terms). The pre and post intervention BP values, were compared for change within the cohort. The significance level was .05. Frequencies and percentages were determined for post-only BP that achieved the target BP range (see Appendix L for statistical analysis template).

Results

Setting and Participants

The quasi experimental evidence based quality improvement project was completed at an outpatient primary care clinic in rural Missouri. Participants were recruited between August 2016 and September 2016. A total of seven participants with uncontrolled primary hypertension were recruited for the study: however, only six of the participants completed the study, one of the participants was unable to keep the scheduled 3 and 6 month appointments, as such was excluded from the study and data analysis. The mean age of the participants was 62.1 years. The oldest participant was 79 years while the youngest was 35 years old. All study participants were Caucasians.

Intervention Course

Potential participants were identified through prospective chart review and recruitment occurred during individual participant's clinic appointments. After recruitment into the study, each participants BP was obtained and the HCHTS measurement tool was administered and the responses to the HCHTS were reviewed with each participant. Each participant's educational

level was obtained. The education was delivered using the SIMPLE method and participants were given take home pamphlets. Participants' questions were answered and participants were scheduled for a 3 and 6 months follow up appointment. At the 3 and 6 month follow up visit, BP readings were obtained and compared to pre-intervention BP values and reviewed with the participant. Participants received education based on responses on the adherence tool.

Outcome Data by Sub-Topics

Three months post intervention data. Although the *t* test did not show statistical significance at $p < 0.05$ however, thirty three percent of the participants had a reduction in both their SBP and DBP at 3 months met their target SBP and DBP ranges. The Wilcox signed rank test showed a zero median difference between pre intervention SBP and 3 months post intervention SBP likewise the median difference between the pre intervention DBP and 3 months post intervention DBP was zero. That data showed that education can lead to reduction in BP values (See Appendix P).

Six months post intervention data. The *t* test result for the 6 months data did not show statistically significant difference at $p < 0.05$ however, thirty three percent of the participants met their target SBP and DBP ranges at the 6 months follow up visit. The Wilcoxon signed rank test at 6 months post intervention showed a zero median difference between pre intervention SBP and 6 months post intervention SBP. Likewise the median difference between the pre intervention DBP and 6 months post intervention DBP was zero. That data showed that education can lead to a reduction in BP values (See Appendix Q).

Discussion

Successes, Most Important

Thirty-three percent of the participants met their target BP ranges at 3 and 6 months post intervention. The participants were equipped with knowledge of hypertension trajectory, medication management, and the importance of adhering to prescribed treatment regimen. Hopefully the knowledge acquired by the patients will be utilized in the future. According to Faller, Ehlebracht-König, and Reusch, (2015), health education provides patients with the skills they need to self-manage their illness and is the bedrock for behavior modification that ultimately leads to better outcome; therefore patient education must be a continuous process and health care providers must not relent in this aspect of care giving. The authors also believed that health education empowers patient to make informed decisions and be partners in their health care.

Study Strengths

The study strength includes the ease of accessibility to the resources needed to complete project, the support of the preceptor, and the ease of recruitment of participants. The recruitment and implementation of the intervention was without obstacle as it occurred at the same clinical site and during patients scheduled clinic appointments. Patient did not have to make extra visits to the clinic.

Results Compared to Evidence in the Literature

The results of the study failed to mirror the evidence from literature that provided the evidence support for the project. In a randomized control trial, study participants in the intervention group who received education on life style modification and medication adherence had a significant reduction in systolic blood pressure (SBP, $p = 0.004$) and a significant reduction

in diastolic blood pressure (DBP, p = 0.001). This was due to increased adherence to medication and lifestyle modification (Golshahi et al., 2015). However, the results of this project did not show any statistical difference between the pre and post intervention systolic and diastolic BP for 67% of the participants largely due to small sample size and short length of study.

According to the USDHHS Million Heart Program ® (2013), multifactorial interventions were shown to be more effective than any single intervention in increasing adherence to a high blood pressure treatment regimen in multiple studies. Therefore, the use of the SIMPLE tool by pharmacists and nurses in face-to-face settings was shown to be effective in improving adherence as it addressed causes of nonadherence in (ACPM, 2011). Although the SIMPLE tool was the intervention tool in this current study the outcome data did not demonstrate a positive outcome for the majority of participants as demonstrated in literature.

A systematic review of pharmacy led interventions on blood pressure control in patients with hypertension by Cheema, Sutcliffe, and Singer (2014) showed significant reductions of 6.1 mmHg in SBP in 11 studies that involved 2,240 patients ($p < 0.00001$, Cl 95%) and 2.5 mmHg reduction in DBP in studies that involved 2,246 patients ($p < 0.00001$, Cl 95%). In contrast, the results of this current project did not demonstrate reductions in BP values post intervention for 67% of the participants.

Limitations

Internal Validity

According to Vogt (1993) confounding variables shadow the effects of another variable and therefore obscure both the data and conclusions drawn from the study. The effects of confounding variables in a study make it difficult to ascertain whether the interventions caused the effect or that the outcome was due to the influence of confounding variable (Vogt, 1993).

Confounding variables may inaccurately increase or decrease the degree of an association, or even invert the direction of the association between the intervention and outcome in a study (Kamangar, 2012). For this EBP project, some of the sources of confounding variables included activities the patient may have engaged in prior to appointment and shortly before the BP check. The consumption of caffeine, smoking, or alcohol 30 minutes before measuring BP elevates the values (CDC, 2014). Another confounding factor of concern is if the patients took their antihypertensive medication before appointment or if it was skipped, as this will have an effect on the BP value.

For a variable to be confounding, it must be aligned with an independent variable and also be directly allied with the study outcome and dependent variable (Vogt, 1993). In order to make a study outcome valid, the effect of confounding variables must be controlled. Effects of confounding variables must be overcome in order to improve the validity of the outcome of research study, and randomization with large sample sizes has been shown to be one of the most effective method to decrease the effect of confounders because randomization has the potential of balancing the different aspects of the study for both the unknown and known confounding variables (Kamangar, 2012). However due to the small sample size and short time length, randomization could not be used in the current study.

External Validity

This evidence-based project had a small participant size of six Caucasian adults. The mean age of the participants was 62.1 years. The oldest participant was 79 years while the youngest was 35 years old. The small sample size and lack of diversity in race, ethnicity, and age affects the external validity of the findings. For any evidence-based program to be acceptable, the issue of external validity must be addressed (Prohaska & Etkin, 2010). However the project

can be replicated to test the validity, and according to Prohaska and Etkin, (2010) the factors which determine the acceptance of an evidence-based program is the establishment of success of the program through numerous replications of the intervention within diverse groups and settings.

Sustainability of Effects and Plans to Maintain Effects

Sustainability of the project will be dependent on the appointment of a project coordinator who will monitor compliance and sustainability of the project. Second, measurement of adherence and patient education can be incorporated into the care of patients with uncontrolled hypertension due to nonadherence by allocating 5-10 minutes of their clinic appointment to education.

Efforts to Minimize the Study Limitations

The major limitation to this EBP project was the small size and lack of diversity of participant in terms of race, ethnicity, and age. To minimize this in a future study, the study should be replicated in a setting with diverse population, and conducted over a longer period of time.

Interpretation

Expected and Actual Outcomes

The expected outcome was that participants would achieve their target blood pressure range as evidenced by reduction in 3 and 6 months post intervention BP readings However, 33.3% of the participant achieved their target BP ranges. The failure of the other 67% to achieve the expected outcome is attributed to the short length of project implementation. If the project was completed over a longer period of time, then BP control may have been fostered and found in longer term outcome measures. A longer duration of interaction with the participants may

have improved the therapeutic relationship and communication line between the student investigator and the participants.

Intervention Effectiveness

The ease and effectiveness of the interventions are attributed first to all the participants who were cooperative and willing to participate in the project, and second to the support of the project preceptor who allocated time for the student investigator to offer the health education to the participants. And last, the organizational structure was welcoming to programs that have the potentials of improving patient care outcomes.

Intervention Revision

Telephonic follow up care might improve attainment of the outcomes of the project. According to Adams et al., (2013), telephonic health training is positively associated with patient motivation. Telephonic follow up care has been used to improve patient care in other chronic disease care. In a study conducted by Slater and Philip (2008) on cost effectiveness of telephonic care, the researchers found that a telephonic program for Congestive heart failure was effective in meeting both patient and organizational goals in reducing readmissions. According to Martin, French, and Janos (2010), once the therapeutic relationship was established, patients became more open during telephonic care in acknowledging symptoms, asking health related questions and in accepting and working towards prescribed treatment regimen in order to achieve their health goal.

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

The aim of this project was to empower patients with knowledge through the provision of structured evidence based education using the SIMPLE method so they can better manage their HTN as they develop self-efficacy. This would lead to an increase in adherence, achievement of

recommended BP target per JNC 8 guideline and prevention of secondary complications of hypertension. The estimated cost of project intervention was $650 while the actual cost of project intervention was $450. Included in the cost of the project intervention were the cost of supplies, printing, copying, and dissemination. This project should be embarked on as a continuous quality improvement and does not require major organizational policy changes. The completion of this project was made possible by funding from presidents and past presidents general assembly of greater Kansas City's memorial fund to the Mary Margaret Miller graduate assistance endowment fund award through the University of Missouri Kansas City Women's Council Graduate Assistance Fund

Conclusions

Practical Usefulness of Intervention

The implementation of this evidence based intervention will enhance the quality of care for patients with hypertension through standardization of education and measurement of adherence. Furthermore the intervention will empower patients to be partners in their own care, and improve communication between patient and healthcare professionals leading to reduction in health care burden and improved quality of life.

Further Study or Implementation of Intervention

The applicability of this evidence based intervention on other chronic condition should be studied. This intervention may also be beneficial to patients with other chronic cardiovascular diseases who are not adherent to prescribed treatment regimen.

Dissemination

The proposal for this evidence based quality improvement project was disseminated at the University of Missouri Kansas City Health Science Student Summit in spring 2016 and the

Advanced Practice Nurses of Ozark, Cradle to Grave Conference on November, 11, 2016. The final project was accepted for presentation at the University of Missouri Health Science Summit on the 25th of April 2017. Dissemination of the EBP project findings will promote professionals to adopt this evidence based practice intervention into their practice settings in order to improve the management of patients with uncontrolled hypertension due to nonadherence.

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Appendix A

Synthesis of Evidence Table

Education and Support

First Author Year Title/Purpose	Research design Evidence level	Sample Setting	Results Analysis uses	Limitation and or Usefulness
Gwadry-Sridhar (2013). Impact of interventions on medication adherence and blood pressure control in patients with essential hypertension: a systematic review by the ISPOR medication adherence and persistence special interest group.	Systematic review Level I	97 articles published between 1979 and 2009 were retrieved and reviewed	35 (35 of 97, 36.1%) examined interventions to directly improve medication adherence, and (58 of 97, 59.8%) were randomized controlled trials.	The systematic review showed that improving patients' knowledge of medication has the prospective of improving adherence to antihypertensive and improving clinical outcome.
Alhalaiqa (2012). Adherence therapy for medication non-compliant patients with hypertension: A randomized controlled trial.	Randomized Controlled Trial Level I	136 non-compliant hypertensive patients, 130 completed. Conducted in an outpatient settings	Intervention group achieved a decrease in SBP by mean of −23.11 mm Hg (95% CI) and diastolic BP (DBP) by −15.18 mm Hg (95% CI) Analysis CI	Adherence scores were correlated with BP (SBP: −0.71, P<0.001, DBP: −0.63, P<0.001) negatively, that is, reduction in BP was the outcome of adherence.
Viswanathan (2012). Interventions to Improve Adherence to Self-administered Medications for Chronic Diseases in the United States: A Systematic Review.	Systematic review Level I	4124 eligible peer-reviewed publications and abstracts from MEDLINE and the Cochrane Library published up unto 4 June 2012	Reduction of copayments, case management and patient level education all improves adherence to antihypertensive therapy in diverse clinical conditions	Evidence is lacking on the broad applicability of these approaches and long-term health outcome
Hosseininasab (2014). Self-Monitoring of Blood Pressure for Improving Adherence to Antihypertensive Medicines and Blood Pressure Control:	Randomized Controlled Trial. Level II	190 study hypertensive subjects in an outpatient setting	Intervention group achieved a reduction in DBP up to week 24 (P = 0.01). Both groups showed	Education and self-monitoring of BP leads to better adherence to BP medication

			adherence rates of more than 95% Analysis CI	
Hacihasanoğlu (2011). The effect of patient education and home monitoring on medication compliance, hypertension management, healthy lifestyle behaviors and BMI in a primary health care setting.	Randomized control study Level II	120 hypertensive patients monitored at home	The number of patients who regularly use medication was significantly increased after education ($p < 0.001$); there was no significant increase in medication compliance in the control group ($p > 0.05$)	Intervention in form of education improved medication adherence
Saleem (2015), Pharmacist intervention in improving hypertension-related knowledge, treatment medication adherence and health-related quality of life: a non-clinical randomized controlled trial.	Randomized control trial Level II	385 hypertensive patients aged 18 years and above. Study was conducted in an out-patient cardiac setting	The intervention group had a significant increase ($P < 0.001$) in their knowledge of hypertension and increase in medication adherence on the HFQ and DAI-10 tools respectively. Analysis- CI	A pharmacist-initiated educational interventions helped improving knowledge of hypertension and adherence to medication regimen.
Narjis (2013). Impact of a community pharmacists' hypertension-care service on medication adherence.	Randomized Control Study Level II	176 patients with hypertension in a community setting	The intervention group had a higher odds of adherence to antihypertensive drug therapy in was 4.07 (95% CI: 1.04-15.95; $P = .044$) times more than the control group. Analysis- Odds ratio and CI	Education improved adherence to antihypertensive therapy
Wang (2011). Effects of pharmaceutical care interventions on blood pressure and medication adherence of patients with primary hypertension in China.	Randomized control trial Level II	60 hypertensive patients in out-patient setting	The intervention group showed a higher percentage of patients with high adherence (72.41%) at 12 months, compared to the control group	Pharmaceutical care intervention might contribute to better BP, and could improve medication adherence

Morgado (2011). Pharmacist intervention program to enhance hypertension control: A randomized controlled trial**.**	Randomized control trial Level II	197 hypertensive patients	The intervention group had higher BP control (P = 0.005). SBP was significantly lower (-6.8 mmHg, P = 0.006) and DBP (-2.9 mmHg, P = 0.020).Adherence level was also higher in the intervention group compared to the control group (74.5% vs. 57.6%, P = 0.012). Analysis- CI	Pharmacist intervention in form of education has the prospect of improving adherence to antihypertensive therapy
Roumie (2006). Improving blood pressure control through provider education, provider alerts, and patient education: a cluster randomized trial.	Cluster randomized trial Level II	1341 veterans and 182 Providers in an out-patient settings	Patients in the patient education group achieved a decrease in their SBP compared with those in the provider education or provider education and alert groups 95% CI, 1.06 to 1.62]; P = 0.012). Analysis- CI	Patient education in addition to provider education can lead to improvement in adherence
Stewart (2014). A multifaceted pharmacist intervention to improve antihypertensive adherence: a cluster-randomized, controlled trial (HAPPy trial).	Cluster Randomized control Trial Level II	395 non-compliant hypertensive patients	The intervention group had a significant reduction in mean SBP (10·0 mmHg vs. 4·6 mmHg; P = 0·05). Adherence also increased at 6 months by 22·6% (95% CI 5·1-40·0%) higher in the intervention group (61·8% vs. 39·2%, P = 0·007). Analysis- CI	Interventions in form of medication education by pharmacist led to reduction in BP and increase in adherence to antihypertensive medication

Life Style Modification

First Author Year Title/Purpose	Research design Evidence level	Sample Setting	Results Analysis uses	Limitation and or Usefulness
Golshahi (2015). Effect of self-care education on lifestyle modification, medication adherence and blood pressure in hypertensive adults:	Randomized controlled clinical trial. Level II	The180 patients with HBP assigned to four equal groups of A, B, C, and D.	Group(intervention) had a significant reduction in SBP/DBP (P = 0.004), compared to group B (P = 0.001) and group C (P = 0.02) Analysis- paired t-test, ANOVA and CI	Education lead to increase in consumption of more fruits and vegetable and better compliance to diet and life style modification
Friedberg (2015), Effectiveness of a tailored behavioral intervention to improve hypertension control: primary outcomes of a randomized controlled trial Hypertension.	Randomized controlled trial Level II	705 Veterans with hypertension in out-patient settings	6-month mean SBP for those in SMI (intervention) compared to UC(control) (131.2 versus 134.7; P=0.009) Analysis-CI	Tailored behavioral intervention lead to adherence and reduction in BP
Ogedegbe (2012). A randomized controlled trial of positive-affect intervention and medication adherence in hypertensive African Americans.	A Randomized Control Trial Level II	256 African American with hypertension	PA group had a higher medication adherence at 12 months than PE group (42% vs 36%, respectively; P =.049). Analysis-CI	Personal affect motivation in combination with education improved adherence to medication more significantly than any of the interventions only
Bosworth (2009). Two self-management interventions to improve hypertension control: a randomized trial.	Randomized control trial Level II	636 adults with diagnosed primary hypertension in out-patient setting were enrolled in the study but 475	BP control relative to the usual care group were 4.3% (95% CI, -4.5% to 12.9%) in the behavioral intervention group, 7.6% (CI, -1.9% to 17.0%) in the home BP monitoring	Telephone intervention administered by nurses directed at hypertension-related behaviors was able improved adherence to hypertension care

		completed the study	group, and 11.0% (CI, 1.9%, 19.8%) in the combined intervention group. Relative to usual care Analysis- CI	

Culturally Tailored Health Education

First Author Year Title/Purpose	Research design Evidence level	Sample Setting	Results Analysis uses	Limitation and or Usefulness
Beune (2014). Culturally adapted hypertension education (CAHE) to improve blood pressure control and treatment adherence in patients of African origin with uncontrolled hypertension: cluster-randomized trial.	Cluster Randomized Trial Level II	136 hypertensive patients from African origin, study completed in an outpatient setting	Dissimilarities in SBP and DBP reduction were -1.69 mmHg (95% CI: -6.01 to 2.62, P=0.44) and -3.01 mmHg (-5.73 to -0.30, P=0.03) in favor of the intervention group. Analysis- CI	Intervention in form of education, improved adherence to antihypertensive therapy
Meinema (2015), Determinants of Adherence to Treatment in Hypertensive Patients of African Descent and the Role of Culturally Appropriate	Cohort study level IV	The researchers evaluated data of 139 patients who participated in the CAHE trial	Culturally Appropriate Health Education (CAHE) was instrumental in patients' adherence as it increased patients' knowledge to chronicity of hypertension	Adherence to antihypertensive regimen was greatly influenced by medication self-efficacy and Social support.

Multidimensional Interventions

First Author Year Title/Purpose	Research design Evidence level	Sample Setting	Results Analysis uses	Limitation and or Usefulness
Pouchain (2013). Effects of a multifaceted intervention on cardiovascular risk factors in high-risk hypertensive patients: the ESCAPE trial, a pragmatic cluster randomized trial in general practice.	Cluster Randomized Trial Level II	257 General practitioners and 1832 hypertensive patients in out-patient settings	The was a significant increase in number of patients in the intervention group who attained their target blood pressure compared to those in the control group: OR (odds-ratio) 1.89, (95%	Education led to improved adherence and better BP control

			confidence interval (CI) 1.09 to 3.27, P = 0.02). Analysis- odds ratio and CI	
Pladevall (2010). A Multi-Center cluster-randomized trial of A Multi-factorial 1ntervention to improve antihypertensive medication adherence and blood pressure control among patients at high cardiovascular risk (The COM99 study).	Cluster randomized control trial Level II	877 Provides and patients with hypertensio n. Study conducted in an out-patient setting.	The intervention patients had decrease in SBP (odds ratio 0.62; 95% confidence interval CI 0.50–0.78) and were more likely to be adherent (OR 1.91; 95% CI 1.19–3.05) when compared with control group Analysis- odds ratio and CI	Multifactorial interventions has the prospect of improving adherence to hypertensive regimen
Cheema (2014). The impact of interventions by pharmacists in community pharmacies on control of hypertension: a systematic review and meta-analysis of randomized controlled trials.	Systematic Review Level II	The researchers retrieved and reviewed 340 articles publications up unto November 2013 of which 16 were randomized trials which included intervention s that were pharmacist led	The pharmacist led interventions group showed significant reductions in SBP in 11 studies (2240 patients); −6.1 mmHg (95% confidence interval, −3.8 to −8.4 mmHg); P < 0.00001] and DBP in 11 studies (2246 patients); −2.5 mmHg (95% confidence interval, −1.5 to −3.4 mmHg); P < 0.00001]. Analysis-CI	The pharmacist led interventions showed significant reductions in SBP

Appendix B

The SIMPLE Method

As a health care professional, you can empower patients to take their medications as prescribed. Effective two-way communication is critical; in fact, it doubles the odds of your patients taking their medications properly.

Million Hearts® is a national initiative to prevent 1 million heart attacks and strokes by 2017. It is led by the Centers for Disease Control and Prevention

Use the SIMPLE method to help improve medication adherence among your patients

Simplify the regimen

- ☐ Encourage patients to use adherence tools, like day-of-the-week pill boxes or mobile apps.
- ☐ Work to match the action of taking medication with a patient's daily routine (e.g., meal time or bed time, with other medications they already take properly, etc.).

Impart knowledge

- ☐ Write down prescription instructions clearly, and reinforce them verbally.
- ☐ Provide websites for additional reading and information—find suggestions at the **Million Hearts®** website.

Modify patients' beliefs and behavior

- ☐ Provide positive reinforcement when patients take their medication successfully, and offer incentives if possible.
- ☐ Talk to patients to understand and address their concerns or fears.

Provide communication and trust

- ☐ Allow patients to speak freely. Time is of the essence, but research shows most patients will talk no longer than 2 minutes when given the opportunity.
- ☐ Use plain language when speaking with patients. Say, "Did you take all of your pills?" instead of using the word "adherence."
- ☐ Ask for patients' input when discussing recommendations and making decisions.
- ☐ Remind patients to contact your office with any questions.

Leave the bias

- ☐ Understand the predictors of non-adherence and address them as needed with patients.
- ☐ Ask patients specific questions about attitudes, beliefs, and cultural norms related to taking medications.

Evaluate adherence

- ☐ Ask patients simply and directly if they are sticking to their drug regimen.
- ☐ Use a medication adherence scale—most are available online:
  - ○ Morisky-8 (MMAS-8)
  - ○ Morisky-4 (MMAS-4 or Medication Adherence Questionnaire)
  - ○ Medication Possession Ratio (MPR)
  - ○ Proportion of Days Covered (PDC)

Appendix C

Cost for Project

Item	Cost
Supplies and materials	$50.00
Printing and Copying	$300.00
Dissemination	$100.00
Total Cost	$450.00

Appendix D

Logic Model

Inputs	**Intervention(s)** *Activities*	**Outputs** *Participation*	**Outcomes -- Impact** *Short*	*Medium*	*Long*
Evidence, sub-topics •Education and support •Lifestyle Modification •Culturally Tailored Education •Multidimensional Intervention •Evidence Based Tool SIMPLE **Major Facilitators or Contributors** •Professional knowledge •Research findings that support project •Fostering the belief that project improves patient care •Building teamwork and collaboration **Major Barriers or Challenges** •Patients' unwillingness to participate in the EBP •In adequate time to conduct education in outpatient setting •Inadequate knowledge of operational guideline of clinical site •Small participant number	**EBP intervention supported by the evidence** Education and support •Lifestyle Modification •Culturally Tailored Education •Multidimensional Intervention •Evidence Based Tool SIMPLE **Major steps of the intervention** **Step 1** Patient identification and Chart review Recruitment of participants' education Obtain consent **Step 2** Obtain baseline BP for study Obtain baseline Adherence score **Step 3** Administer 10 minutes structured education Using SIMPLE method **Step 4** (3 months follow up) Measure BP Measure adherence Continue education Answer question **Step 5** (6 months follow up) Measure BP Measure adherence Educate Answer questions	**The participants (subjects)** Adults with hypertension who are non-adherent to therapy and have BP consistently outside the target range per JNC 8 guideline **Site** Rural health clinic, Missouri **Time Frame** September 2016 to March 2017(6 months) **Consent Needed or other** Will be determined by UMKC IRB **Person(s) collecting data** Student **Others directly involved** Preceptor	**(Completed as student)** **Outcome(s) to be measured with valid & reliable tool(s)** •Adherence to therapy using Hill Bone Compliance Scale educational intervention •BP readings pre and post intervention **Statistical analysis to be used** Paired T-test	**(after student DNP)** **Outcomes to be measured** **Blood pressure**	**(after student DNP)** **Outcomes that are potentials** **Knowledge of disease management and importance of adherence**

Appendix E

Recruitment Script

Excuse me, sir/ madam

My name is Priscilla Agali

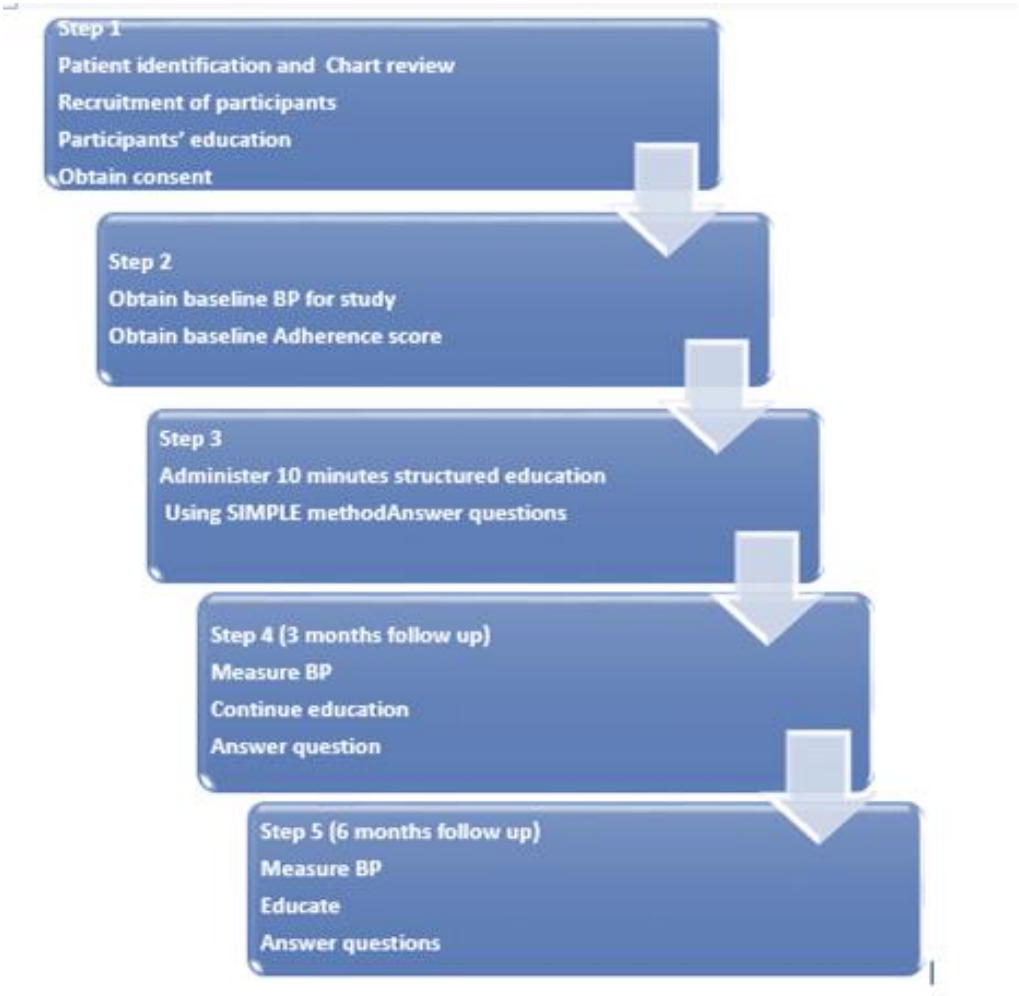
I am a graduate student at school of Nursing University of Missouri Kansas City and for my doctorate project, I am working on a quality improvement project, on improving adherence to high blood pressure therapy. You received information about this project in the packet the nurse gave you during check in.

I am approaching you because we are looking for adults who have uncontrolled high blood pressure. This study is totally separate from the care you are receiving here at clinic and whether or not you decide to participate it will not affect your care. I'm here to follow up to see if you are interested in hearing more about this project and if you would like to participate

Should you decide to participate, you will be required to fill out a medication adherence form, and based on your responses, you will be provided education on how best to improve adherence to your provider prescribed therapy. You blood pressure will be checked before and after the education.

Appendix F

Intervention flow Diagram



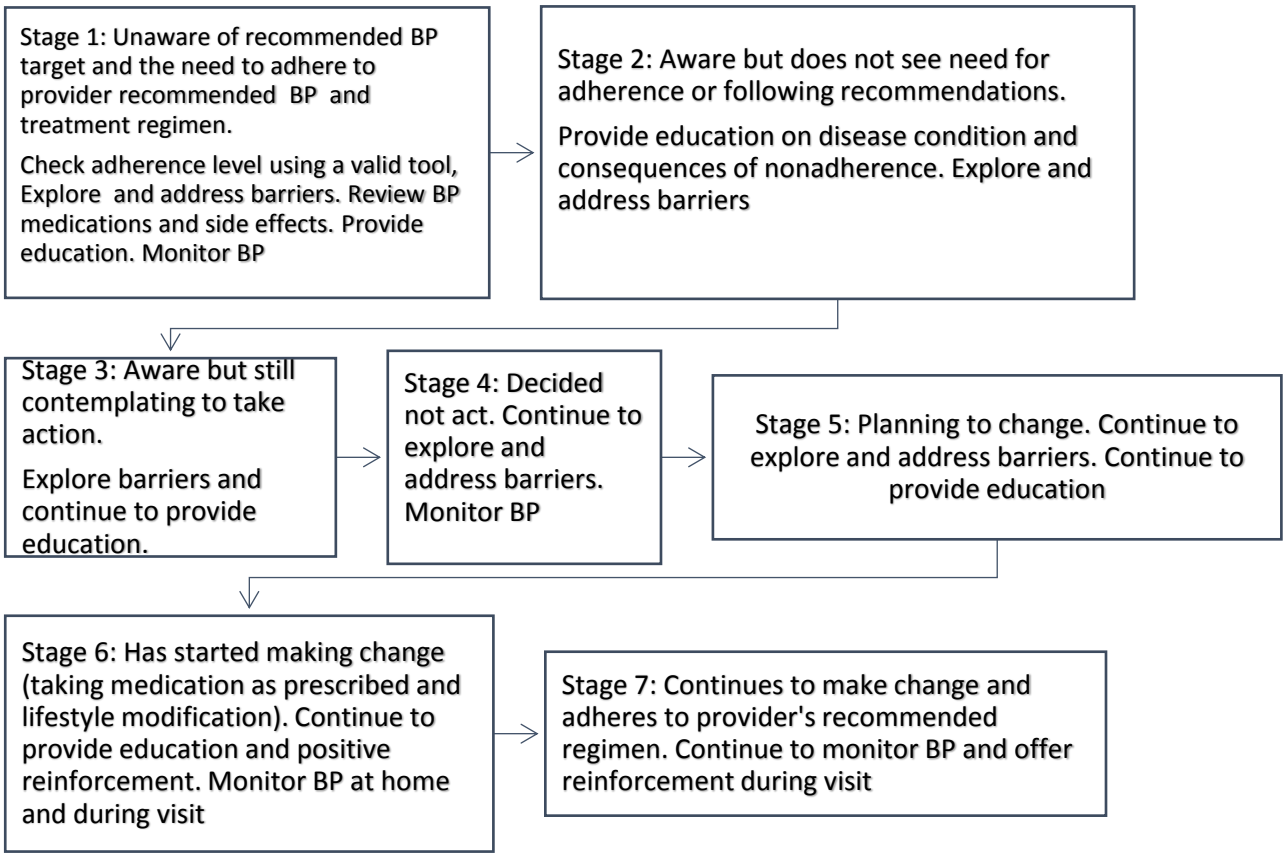
Appendix G

Project Timeline Flow Graphic

ACTION	TIME
Problem identification, linking problem with interventions and outcome PICOT formulation	Completed
Identify type and source of evidence. Conduct search	Completed
Synthesis of evidence	Completed
Define proposed change Identify needed resources and cost Design implementation plan	Completed
Implement project Monitor process	Completed
Collect data Analyze data Communicate results to stakeholders Integrate into standard of practice Disseminate result of project	Completed

Appendix H

Change Model



Appendix I

Measurement Tool

HILL-BONE HIGH BLOOD PRESSURE COMPLIANCE SCALE

(NA=not applicable / DK=don't know)	None of the time	Some of the time	Most of the time	All the time	NA	DK
1. How often do you forget to take your HBP medicine?	1	2	3	4	8	9
2. How often do you decide not to take your HBP medicine?	1	2	3	4	8	9
3. How often do you eat salty food?	1	2	3	4	8	9
4. How often do you shake salt, fondor, or aromat on your food before you eat it?	1	2	3	4	8	9
5. How often do you eat fast food? (KFC, McDonalds, fat cook, fish and chips)	1	2	3	4	8	9
6. How often do you get the next appointment before you leave the clinic?	1	2	3	4	8	9
7. How often do you miss scheduled appointments?	1	2	3	4	8	9
8. How often do you leave the dispensary without obtaining your prescribed pills? (due to long line, closure of clinic, forgot)	1	2	3	4	8	9
9. How often do you run out of HBP pills?	1	2	3	4	8	9
10. How often do you skip your HBP medicine 1–3 days before you go to the clinic?	1	2	3	4	8	9
11. How often do you miss taking your HBP pills when you feel better?	1	2	3	4	8	9
12. How often do you miss taking your HBP pills when you feel sick?	1	2	3	4	8	9
13. How often do you take someone else's HBP pills?	1	2	3	4	8	9
14. How often do you miss taking your HBP pills when you care less?	1	2	3	4	8	9

Lambert et al. (2006)

Appendix J

Data Collection Template

Participant ID	**Gender**	**Age**	**Race**	**Pre intervention SBP**	**Pre intervention DBP**	**Post intervention SBP 3 months**	**Post intervention DBP 3 months**	**Post intervention SBP 6 months**	**Post intervention DBP 6 months**

Appendix K

Definition of Terms

Adherence: degree to which a patient's behavior (taking medications, following a recommended diet, modifying lifestyle) parallels with provider's prescription

Hypertension: High blood pressure is a common disease in which blood flows through blood vessels (arteries) at higher than normal pressures

Self-efficacy: ability of an individual to efficiently perform a behavior to yield the anticipated health outcome

Quasi experimental design: a nonrandomized experimental study undertaken when it is not logistically possible or ethical to conduct a randomized controlled trial

Validity: accuracy of an assessment, whether an instrument measures what it is supposed to measure

Benchmark: any standard or reference by which others can be measured or judged

Paired T-test: statistical analysis used to compare two population means

Dissemination: to spread throughout

Institutional Review Board: exist to protect the welfare and safety of research participants and to evaluate the balance of risks and benefits of a study within the context of a protocol while retaining the scientific relevance

Autonomy: freedom of choice

DE identified data: unique patient identifiable data have been removed (patients name, address, medical record number, age etc.)

Wilcoxon signed rank test: non parametric test used to compare related sample

Appendix L

Statistics Analysis Data Template

	ID	Gender	Age	Race	Preintervention_SBP	Preintervention_DBP	Postintervention_SBP_3months	Postintervention_DBP_3months	Postintervention_SBP_6months	Postintervention_DBP_6months
1	1.00	Male	58.00	Caucasian	177.00	100.00	173.00	95.00	174.00	99.00
2	2.00	Female	76.00	Caucasian	165.00	91.00	164.00	94.00	156.00	78.00
3	3.00	Male	79.00	Caucasian	155.00	92.00	140.00	70.00	137.00	76.00
4	4.00	Male	61.00	Caucasian	159.00	91.00	158.00	90.00	166.00	92.00
5	5.00	Female	64.00	Caucasian	155.00	80.00	176.00	81.00	161.00	80.00
6	6.00	Female	35.00	Caucasian	154.00	97.00	139.00	84.00	137.00	83.00
7	7.00		.		.	.	.	.	.	.
8	8.00		.		.	.	.	.	.	.
9	9.00		.		.	.	.	.	.	.
10	10.00		.		.	.	.	.	.	.

Appendix M

IRB Approval Letter

UMKC
5319 Rockhill Road
Kansas City Missouri
TEL: 816 235-5927
FAX: 816 235-5602

NOTICE OF NEW APPROVAL

Principal Investigator: Lyla Lindholm
UMKC Health Sciences Building
Kansas City, MO 64108
Protocol Number: 16-351
Protocol Title: Improving adherance to antihypertensive regimen using the SIMPLE method
Type of Review: M
Date of Approval: 08/12/2016
Date of Expiration: 12/31/2999

Dear Dr. Lindholm,

The above referenced study, and your participation as a principal investigator, was reviewed and approved by the UMKC IRB. You are granted permission to conduct your study as described in your application.

This approval includes the following documents:

The ability to conduct this study will expire on or before 12/31/2999 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.

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; phone: (816)235-5927) if you have questions or require further information.
Thank you,

UMKC

Simon MacNeill

Appendix N

Result Table

Paired Samples Test

		Paired Differences					t	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper		
Pair 1	Preintervention_SBP - Postintervention_SBP_3months	2.50000	13.20227	5.38981	-11.35494	16.35494	.464	.662
Pair 2	Preintervention_SBP - Postintervention_SBP_6months	5.66667	10.91177	4.45471	-5.78453	17.11786	1.272	.259
Pair 3	Preintervention_DBP - Postintervention_DBP_3months	6.16667	9.60035	3.91933	-3.90828	16.24161	1.573	.176
Pair 4	Preintervention_DBP - Postintervention_DBP_6months	7.16667	7.93515	3.23951	-1.16077	15.49410	2.212	.078

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Preintervention_SBP	160.8333	6	8.90880	3.63700
	Postintervention_SBP_3months	158.3333	6	15.93319	6.50470
Pair 2	Preintervention_SBP	160.8333	6	8.90880	3.63700
	Postintervention_SBP_6months	155.1667	6	15.27634	6.23654
Pair 3	Preintervention_DBP	91.8333	6	6.85322	2.79782
	Postintervention_DBP_3months	85.6667	6	9.43751	3.85285
Pair 4	Preintervention_DBP	91.8333	6	6.85322	2.79782
	Postintervention_DBP_6months	84.6667	6	8.98146	3.66667

Appendix O

Result Table (Wilcoxon Signed Ranked Test)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Preintervention_SBP and Postintervention_SBP_3months equals 0.	Related-Samples Wilcoxon Signed Rank Test	.343	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Preintervention_SBP and Postintervention_SBP_6months equals 0.	Related-Samples Wilcoxon Signed Rank Test	.249	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Preintervention_DBP and Postintervention_DBP_3months equals 0.	Related-Samples Wilcoxon Signed Rank Test	.207	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

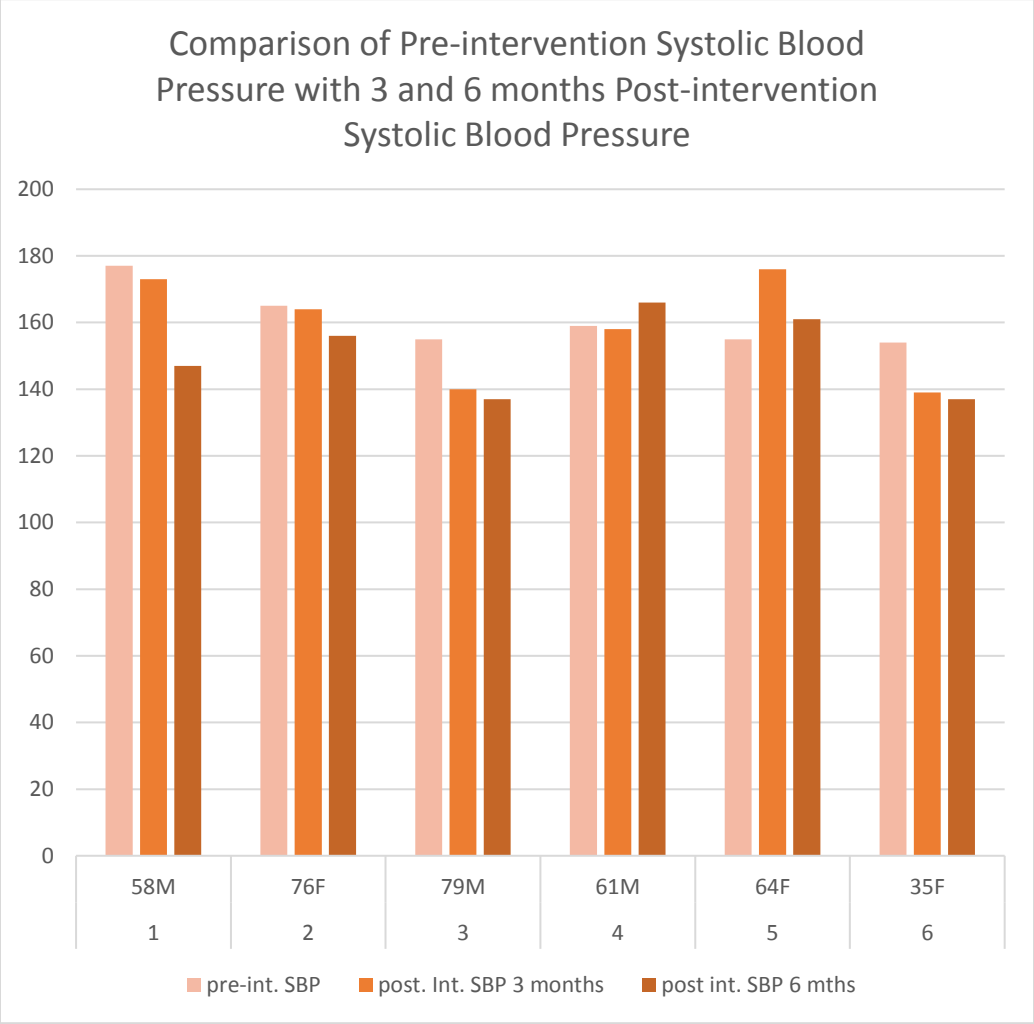
Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between Preintervention_DBP and Postintervention_DBP_6months equals 0.	Related-Samples Wilcoxon Signed Rank Test	.104	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

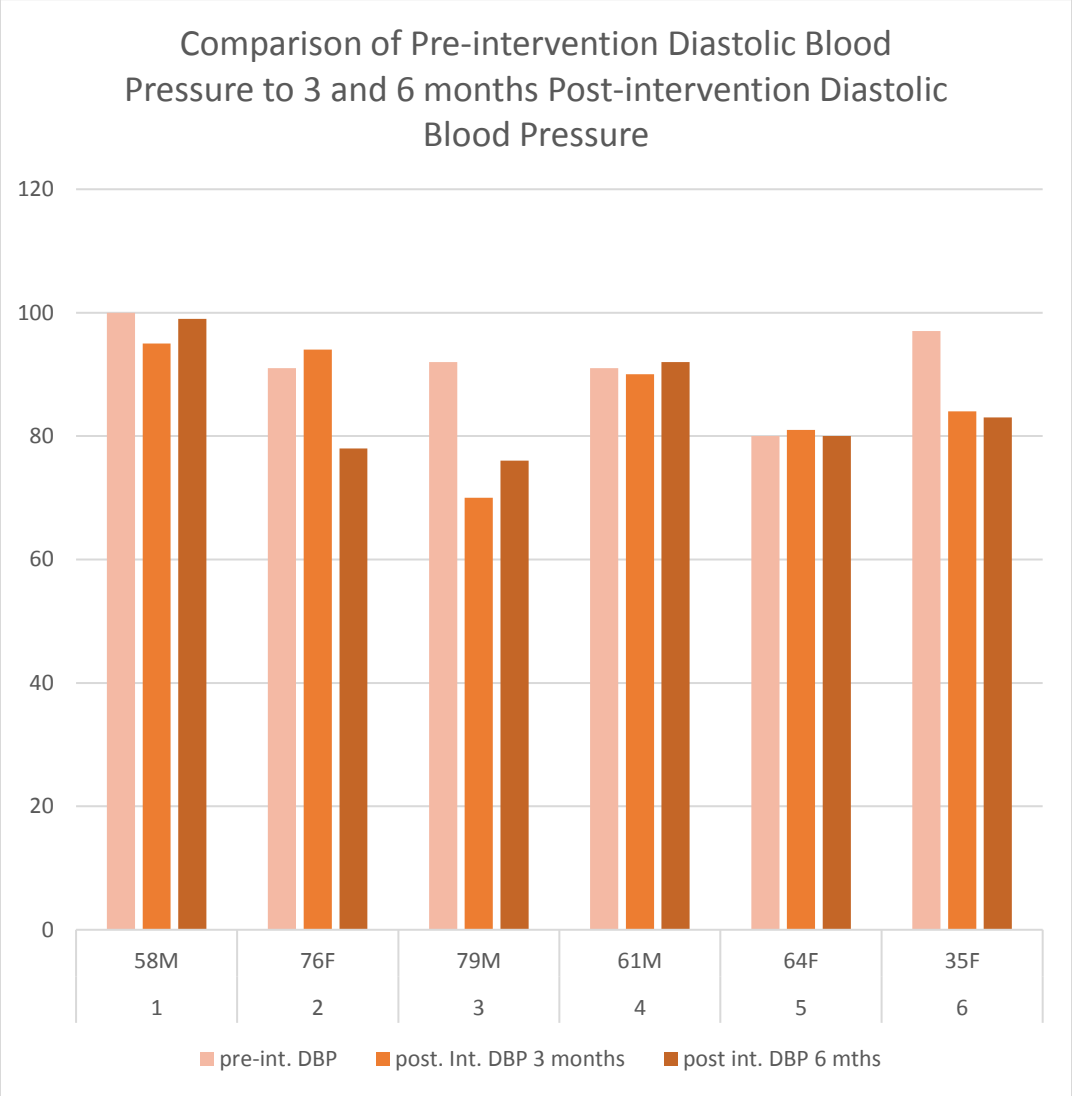
Appendix P

Graphic Representation of Result



Appendix Q

Graphic Representation of Results



Appendix R

UMKC Approval Letter

UMKC School of Nursing and Health Studies

July 27, 2016

Members of UMKC Institutional Review Board
University of Missouri-Kansas City
Kansas City, MO 64108

UMKC IRB,

This letter serves to provide documentation regarding Priscilla Agali's Doctor of Nursing Practice (DNP) Project proposal. Ms. Agali obtained approval for her project proposal, Improving Adherence to Antihypertensive Regimen Using the SIMPLE Method, from the School of Nursing DNP faculty committee on July 27, 2016.

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

Sincerely,

Susan J. Kimble

Susan J. Kimble, DNP, RN, ANP-BC, FAANP
Clinical Associate Professor
DNP Programs Director
UMKC School of Nursing and Health Studies
816-235-5962
kimbles@umkc.edu