Health Literacy Screening to Increase Antihypertensive Medication Adherence

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HEALTH LITERACY SCREENING TO INCREASE ANTIHYPERTENSIVE MEDICATION ADHERENCE

by

BOYANN BONJEAN

EVIDENCE-BASED PRACTICE PROJECT REPORT

Submitted to the College of Nursing and Health Professions of Valparaiso University,
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DEDICATION

This project is dedicated to my Grandmother Grace Lucile Amos who shared her wonderful gift of faith in the living Lord, and who was always filled with love and faith in me. To my husband Alfred who, from the moment I met him, was my rock and lifelong love, and to Michael, Danny, and Angela who told me that quitting this program, “Was not an option”. Lastly, to my grandchildren, Londyn, Remy, and Ryann, you are my inspiration.
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I would like to thank Carole A. Pepa, PhD, R.N., Dr. Pepa’s support and guidance throughout this project was immeasurable. She was always available, and a role model of commitment to the profession of nursing and academia. You have been a wonderful advisor, and I will always be grateful for your support. I would also like to thank Crystal Mason and Briana Austin for their help in collecting data and seeing the project to completion.

I would also like to thank my Aunt Sylvia Dixon who watched my girls Zoë and Eva during the project implementation, and to Rose and Javier Ramos who helped me to keep my life together, by helping me with anything I needed.
The idea for this evidence-based project arose as a result of working in outpatient clinical settings and taking numerous blood pressure readings of patients. Many patients, despite being prescribed antihypertensive medications, had elevated blood pressure readings. When discussing the finding of an elevated blood pressure with patients, many had decided not to take the medication or did not adhere with the prescribed antihypertensive medication regimens. In a majority of the patients who had elevated blood pressure readings, many did not understand the disease of hypertension, the risks associated with non-adherence to antihypertensive medications, and sustained elevated blood pressure complications. For most patients, the results of this lack of understanding was the decision to not take prescribed medications or varying degrees of non-adherence to medication and lifestyle modification regimens.

After discussing with patients their elevated blood pressure findings and the risks associated with hypertension, it was clear there was a lack of understanding and a strong need to increase hypertension knowledge in order to increase the adherence of antihypertensive medication therapies. The question was, why didn’t the patients understand their disease and the importance of taking antihypertensive medication?

The experience identified a need for evidence to support a clinical practice change. The change would be to screen patients to find out if their non-adherence was due to low health literacy, and to provide additional educational information about hypertension in order to increase the adherence of antihypertensive medication therapies. An extensive literature search was conducted, to find evidence to support implementing a screening program for health literacy. The evidence indicated that health literacy screening was an important factor in hypertension management and could help to identify patients who may...
benefit from additional education about hypertension, and antihypertensive medication adherence. Through this evidence-based practice project, a system change of screening patients for health literacy was implemented. The screening process was also used to identify low literacy patients with hypertension so that interventions, which focused on increasing medication adherence, could be delivered.
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ABSTRACT

Health Literacy Screening to Increase Antihypertensive Medication Adherence

Boyann B. Bonjean, BSN, RN

Hypertension contributes to the risk of developing cardiovascular disease (CVD), stroke, heart attack, and chronic kidney disease (CKD) (Abegaz et al., 2016; Weir, 2014; Whelton et al., 2017). Evidence indicates that 30 to 50% of people who are prescribed antihypertensive medication therapy are nonadherent (Hedna et al., 2015). Non-adherence to antihypertensive medications is a major contributor to hypertension treatment failure (Al Ghurair et al., 2012; Hu, 2016; Whelton et al., 2017). Evidence has shown that low health literacy may impact antihypertensive therapy (Slade, 2017). The purpose of this EBP project was to provide an organizational change by implementing a health literacy screening program to identify patients who may be at risk of non-adherence to antihypertensive medication therapies. The theoretical framework of Lewin’s Change theory and the ARCC© model guided this EBP project. Using the REALM-SF health literacy screening tool, 65 participants (N=65) were screened for health literacy. The participants ranged in age from 35 to 86 years with the majority (33.8%) in the 66-74 age range. Six (N= 6) participants scored less than seven on the REALM-SF indicating low health literacy. Low health literacy participants were all 56 years and older. If participants had low literacy and hypertension (N= 6), a Hill-Bone HBP Compliance Scale was then administered. Interventions to increase adherence to antihypertensive medications were then delivered to the participant. A four-week post intervention Hill-Bone Compliance Scale was obtained to measure any change. A paired t-Test comparing the pre and post intervention Hill-Bone HBP Compliance Scale revealed that the intervention was not statistically significant, $N = 6, t (5) = -1.688, CI = -5.88 – 1.22, p = .152$. However, there was a difference in variance, which may indicate a sampling error or small sample size. Further investigation in delivering low literacy interventions aimed at increasing antihypertensive medication adherence with a larger sample size may be indicated.
CHAPTER 1
INTRODUCTION

Background

Hypertension is the medical term used to define elevated blood pressure (Rajpura & Nayak, 2014). Hypertension is classified as elevated systolic, diastolic, or combination of systolic and diastolic blood pressures (Whelton et al., 2017). In the United States, approximately 65 million Americans or approximately 33% of American adults have hypertension (Centers for Disease Control and Prevention [CDC], 2016; Roldan, Ho, & Ho, 2018; Weir, 2014). Projection estimates are that adults diagnosed with hypertension in the U. S. will increase by 27 million by the year 2030 (Hu, 2016). However, the 2016 projections may underestimate the number of adults with hypertension.

The American College of Cardiology/American Heart Association (ACC/AHA) recently published in 2017 comprehensive recommendations to guide practitioners in the treatment and diagnosis of hypertension (Whelton et al., 2017). Prior to the release of the new guidelines, the National Institutes of Health (NIH) released an in-progress study that contained evidence that the management of hypertension with lower systolic blood pressure is associated with less adverse events including death (U. S. Department of Health and Human Services, NIH, NHLBI, 2015). The results of this study found that aggressive management of hypertension to lower systolic blood pressure to 120 mmHg lowered the rates of myocardial infarction (MI), heart failure, and stroke by approximately 30% and reduced the risk of mortality by approximately 25% (U. S. Department of Health and Human Services, NIH, NHLBI, 2015). With the new 2017 ACC/AHA guidelines, it is anticipated that the number of patients who meet the criteria for hypertension will increase, to approximately 46% of the adults in the United States (Roldan et al., 2018; Whelton et al., 2017).
The new parameters for blood pressure management established by the 2017 ACC/AHA Task Force on Clinical Practice Guidelines are significantly different from previous guidelines. Prior to the 2017 guidelines, blood pressure over 140/90mm Hg was considered stage 1 hypertension (Whelton et al., 2017). However, the new guidelines state that systolic blood pressure at or above 130-139mm Hg or diastolic blood pressure at or above 80-89mm Hg, is now considered stage 1 hypertension (Whelton et al., 2017). Stage 2 hypertension is blood pressure that is greater or equal to 140mm Hg systolic and diastolic blood pressure that is greater to or equal to 90mm Hg (Whelton et al., 2017). The new guidelines also included the initiation of lifestyle modifications, and a reassessment of patients whose blood pressure is 120-129mm Hg systolic with a diastolic blood pressure below 80mm Hg (Whelton et al., 2017).

The new guidelines lowered the threshold of hypertension due to the increased risk of severe complications associated with hypertension such as: myocardial infarction (MI), cerebrovascular accident (CVA), abdominal aortic aneurysm (AAA), as well as heart failure, angina, and peripheral vascular disease (PAD) (Lewington, Clarke, Qizilbash, Peto, & Collins, 2002; Whelton, et al., 2017). In addition to the NIH study, studies that were cited in the new guidelines found that blood pressures 20mmHg higher on systolic reading and 10mmHg higher on diastolic readings more than doubled the risk of mortality from the complications of hypertension (Lewington et al., 2002; Rapsomaniki et al., 2014; Whelton et al., 2017).

Hypertension contributes to significant risks of developing cardiovascular disease (CVD), stroke, heart attack, and chronic kidney disease (CKD) (Abegaz, Shehab, Gebreyohannes, Bhagavathula, & Elnour, 2016; Danaei et al., 2009; Weir, 2014; Whelton et al., 2017). Hypertension is also associated with a decreased life quality and increased risk of mortality and disability (Al Ghurair, Hughes, Simpson, & Guirguis, 2012; Wannasirikul, Termsirikulchai, Sujirarat, Benjakul, & Tanasugarn, 2016). Hypertension is also a major cause of disability and death throughout the world (Abegaz et al., 2016; Ezzati, Lopez, Rodgers, Vander Hoorn, & Murray, 2002; Lim et al., 2012; Forouzanfar et al., 2017; Whelton et al., 2017).
However, the loss of productive life years from disability is thought to be lessened and possibly preventable with proper adherence to treatment regimens (Weir, 2014). Adherence to antihypertensive medications, as well as lifestyle changes, are considered essential to the prevention of complications and optimal treatment of hypertension (Abegaz et al., 2016; Weir, 2014; Whelton et al., 2017). However, even with the significant improvements in the treatment of hypertension, medication adherence remains a major cause of treatment failure (Roldan et al., 2018). The effects of the non-adherence to antihypertensive medications as well as lifestyle modification non-adherence, contributes to the development of severe complications of hypertension, including death. However, evidence has shown that interventions that emphasize adherence to hypertension medications are crucial to both the treatment of the disease and to the prevention of severe complications (Rajpura & Nayak, 2014).

There are two main types of hypertension; primary and secondary. Primary hypertension is also referred to as essential hypertension (Giacalone & Zusman, 2017). Approximately 90%, of hypertension are primary hypertension (Giacalone & Zusman, 2017). Primary hypertension is more prevalent as one ages (Giacalone & Zusman, 2017; Jankowska-Polańska, Uchmanowicz, Dudek, & Mazur, 2016; Nwankwo, Yoon, Burt, & Gu, 2013; Weir, 2014; Whelton et al., 2017). Other risk factors for developing primary hypertension include: obesity, gender, race, diabetes, alcohol use, high sodium diets, and lack of exercise (Chan et al., 2016; Giacalone & Zusman, 2017; Hubert, Feinleib, McNamara & Castelli, 1983; Savica, Bellinghieri, & Kopple, 2010; Whelton, 2014; Whelton et al., 2017). Secondary hypertension occurs in 5-10% of hypertensive patients (Giacalone & Zusman, 2017). Medications such as: steroids, contraceptives, non-steroidal anti-inflammatory medications, and hormone replacement (HRT) may cause secondary hypertension (Giacalone & Zusman, 2017). Other possible causes of secondary hypertension include thyroid disease, renal and endocrine diseases, and obstructive sleep apnea. Rare cases of aortic strictures can also cause secondary hypertension (Giacalone & Zusman, 2017).
Whether hypertension is of a primary or secondary cause, most patients who have hypertension are asymptomatic (Giacalone & Zusman, 2017; Hu, 2016; Weir, 2014; Whelton et al., 2017). The asymptomatic nature of the disease not only interferes with the diagnosis of the disease but may contribute to the patient’s understanding and adherence to antihypertensive medication therapy (Brown & Bussell, 2011; Ghembaza, Senoussaoui, Kendouci Tani, & Meguenni, 2014; Holt, Rung, Leon, Firestein, & Krousel-Wood, 2014; Hu, 2016; Karakurt & Kasikci, 2012; Saleem, Hassali, Shafie, & Atif, 2012; Rajpura & Nayak, 2014; WHO, 2003). Additionally, lack of education from health care providers and patient low health literacy may contribute to the non-adherence of antihypertensive medications (Hu, 2016; Jankowska-Polańska et al., 2016; Roldan et al., 2018).

**Statement of the Problem**

Nonadherence to antihypertensive medications is a major contributor to hypertension treatment failure (Al Ghurair et al., 2012; Hu, 2016; Whelton et al., 2017). Evidence shows that 30 to 50% of patients who are prescribed antihypertensive medications are nonadherent (Hedna et al., 2015). The causes of medication non-adherence are multiple (Abegaz et al., 2016; Al Ghurair et al., 2012; Jones, Treiber & Jones, 2014; Whelton et al., 2017). The effects of non-adherence, along with limitations in the ability to adapt lifestyle modifications, increase the risk of developing complications of hypertension that may result in death (Ghembaza et al., 2014; Whelton, et al., 2017).

Without increased adherence to antihypertensive medications, hospitalizations as well as health care costs are expected to rise (Wannasirikul et al., 2016). Moreover, illness and deaths attributable to hypertension would also be expected to increase. The World Health Organization (WHO) (2013) addressed hypertension as a global problem. The entire world is affected by the global impact of hypertension from health care costs to the impact hypertension has on society and the global economy. Adherence to antihypertensive medications as well as
lifestyle modifications are seen as major solutions to combat serious complications of hypertension.

The United States government health agencies are acutely aware of the problem of lack of medication adherence in hypertension control. The Office of Disease Prevention and Health Promotion (ODPHP), part of the U. S. Department of Health and Human Services, website entitled Healthy People 2020, has identified the percentage of adults whose hypertension is under control at 43.7%, and has set a target to increase the percentage of controlled hypertension cases to 61.2% by 2020 (U. S. Department of Health and Human Services, 2018). The current hypertension control rates of 43.7 percent vs. the target rate of 61.2% identifies hypertension control as a current problem in the United States.

Many researchers have noted that non-adherence rates are even less than the government statistics. Abegaz et al., (2016) stated that uncontrolled hypertensive patients had up to 83.7% non-adherence rates. Al Ghuriar et al., (2012) stated that of the medication that is prescribed for hypertension, only 50-70% of doses are taken, and 50% of antihypertensive therapy is stopped in the first 12 months. Jankowska-Polańska et al., (2016) stated that approximately 30% of women and 40% of men in Poland do not begin prescribed medications for hypertension.

However, the problem of non-adherence with anti-hypertensive medications is not new. The World Health Organization (WHO) in 2003 also identified medication adherence to antihypertensive medications as a global health issue (WHO, 2003). In the WHO report, a patient’s knowledge or understanding and thoughts about hypertension were listed as significantly contributing to the non-adherence to antihypertensive medications. Illiteracy was specifically mentioned as one of the significant causes of medication non-adherence to hypertensive medications. The WHO included in the report that the obligation of adherence to antihypertensive medications should be shared by the provider, the patient, and the health care organization (Hu, 2016; WHO, 2003). Therefore, solutions to non-adherence must focus on the
underlying factors, such as health literacy, that contribute to the non-adherence of antihypertensive medications.

In Indiana, 696,440 residents age 25 and older had less than a 12th grade education and no high school or equivalent diploma (Indiana State Department of Health [ISDH] 2018). The total population for the state of Indiana in 2017 is estimated to be 6,666,818 persons (U.S. Department of Commerce, 2018). Thirty three percent of Indiana adults are reported to have hypertension (ISDH, 2012). Census statistics state that 76.4% of the Indiana population is over 18 years old (U.S. Department of Commerce, 2018). Based on the total population and the adult population percentage, the number of adults in Indiana is over five million persons. Thirty three percent of the approximately five million adults is approximately 1,672,000 Indiana adults with hypertension. To calculate the approximate number of non-adherent hypertension persons, using the current adherence rate of 43.7% (HHS, 2018) the approximate number of non-adherent hypertensive Indiana citizens would be approximately 936,000 persons. According to a 2006 report, 14% of the almost one million non-adherent hypertensive Indiana adults may have below basic health literacy levels which may also be a factor contributing to non-adherence (Greenberg, Jin, & Paulsen, 2006).

Although interventions to increase adherence of antihypertensive medications appears to be lacking in many healthcare systems, systematic reviews, evidence summaries, and the World Health Organization (WHO) present an underlying concern that patient interventions to increase understanding and promote health literacy are needed to increase medication adherence (Abegaz et al., 2016; Al Ghurair et al., 2012; Slade, 2017; Whelton et al., 2017, WHO, 2003). Evidence has shown a strong association between health literacy and medication adherence (Ghembaza et al., 2014; Jackson, 2012; Jones et al., 2014). Many studies have concluded in their findings that a patient’s health literacy and medication adherence in hypertension are related (Jankowska-Polańska et al., 2016; Wannasirikul et al., 2016). Therefore, screening patients for health literacy, and focusing on interventions that may help low
health literacy patients adhere to antihypertensive medications have been shown to be helpful in increasing adherence to antihypertensive medications (Jankowska-Polańska et al., 2016; Wannasirikul et al., 2016; Whelton et al., 2017).

Data from the Literature Supporting Need for the Project

A clinical practice in Northwest Indiana was chosen as the site for this EBP project. The sole practitioner is a board-certified Internal Medicine physician who has practiced medicine for over thirty years. The office has a large established patient practice in which many of the patients have hypertension. The practice shares office space with a cardiologist and includes one LPN and two medical assistants. Other ancillary staff have limited contact with patients. The office is located in Lake County, Indiana but serves the population of Lake, Jasper, Newton, and Porter counties in Indiana. There are also patients who utilize the clinic who live as far as Lafayette, Indiana and the neighboring state Illinois. The physician is on staff at five hospitals and limits practice to adults age 18 and over.

The practice has a considerable number of patients who are insured with Medicare and Medicaid (Personal communication C. Mason, June 18, 2018). In addition, many of these patients have age related, cognitive, or physical disabilities that may have an effect on their ability to retain or understand medical information. The physician is well-known for taking a significant amount of time when seeing patients, often 45 minutes or more; however a patient’s health literacy and medication adherence to antihypertensive medications is not evaluated or screened.

Purpose of the Evidence-Based Practice Project

The purpose of this EBP project was to provide an organizational change to the practice by implementing a health literacy screening program to identify patients who may be at risk of non-adherence to antihypertensive medication therapies. The EBP project trained staff to provide the Rapid Assessment of Adult Literacy in Medicine-Short Form (REALM-SF) (ARQH, 2018) screening while the nursing staff recorded vital signs and documented the
encounter data. The health literacy screening was evaluated, and those with low literacy scores and hypertension, were given the Hill-Bone HBP Compliance Scale (Kim et al., 2000) to evaluate hypertension medication adherence. The information was then provided to the physician, so that educational interventions, such as teach-back techniques, and brochures with easy-to-read information, could be given to the patient. A follow-up Hill-Bone HBP Compliance Scale was administered by telephone approximately four weeks post intervention. The goal of the project was to change the office procedure to include screening for health literacy and provide patient centered interventions to increase antihypertensive medication adherence.

**Compelling Clinical Question**

The clinical question that drove this EBP project was, would screening patients for health literacy and providing patient-centered educational interventions increase adherence to antihypertensive medications?

**PICOT Question**

In adult patients with hypertension, (I) does health literacy screening, along with patient-centered interventions such as, easy to read brochures and communication techniques about antihypertensive medication adherence (C) as opposed to the office standard practice (O) increase medication adherence in patients with low health literacy.

**Significance of the EBP Project**

Low health literacy has been identified as a possible risk to achieving adequate blood pressure control (Slade, 2017; Whelton et al., 2017). By implementing screening for health literacy, and initiating interventions for low health literacy patients, the practice change attempted to increase medication adherence. By attempting to increase adherence to antihypertensive medications, the office implemented a best practice guideline, and also attempted to decrease the risks associated with hypertension (Abegaz et al., 2016; Al Ghurair et
al., 2012; Hu, 2016; Jankowska-Polańska et al., 2016; Wannasirikul et al., 2016; Whelton et al., 2017).
CHAPTER 2
THEORETICAL FRAMEWORK, EBP MODEL, AND REVIEW OF LITERATURE

Theoretical Framework

Overview of Theoretical Framework

The theoretical framework that was chosen to guide this project was the Lewin change theory. Lewin’s theory is centered on organizational change; therefore, it seems an appropriate theory to apply to a system or organizational evidence-based practice project. Lewin’s research began in the 1940’s, with the beliefs that a planned change based on theory and research could help to bring changes that would be lasting and beneficial to an organization (Burnes, 2012). Lewin was able to create a formula and vision that helped to develop the ethical and planned change that became known as an integral part of organizational development (OD) (Burnes, 2012).

Lewin believed that groups were the most effective change agent and not the individual since people are influenced by the groups in which they work and associate (Schein, 1988). By researching a group or organization, also known as field research, the researcher could develop techniques and insight on the group and the individuals in the group (Burnes, 2012). This research would then help to identify how to focus on the group in order to most effectively implement a positive change (Burnes, 2012). Lewin thought that by focusing on small groups, the ability to change an organization and the people within the organization were most likely to change (Burnes, 2012). Since most people work collaboratively in groups or teams, the focus on changing the group makes sense. However, the change must be within the ethical and moral boundaries of the individuals in order to participate in the group change. Also, the change must be something that the individuals think will positively affect the group or organization of which they belong (Burnes, 2012). Lastly, the individual, as well as the group, must understand that
the change is a learning experience (Burnes, 2012). Lewin believed that an organization or group could be motivated to change through a planned action (Burnes, 2012).

Burnes (2012) stated that in preparation for Lewin’s change theory to be successful, he devised a plan in which research and plans for the upcoming organizational change could be studied and evaluated. This process involved field research to study the group or organization and how the change would affect the members of the group. After conducting the field research, a plan of the action was developed to motivate and move the group to the desired change. This point was identified as the group dynamics phase of the change of an organization (Lewin, 1947b). By studying the group, the reaction to the change agent and the action of change was studied as the change to the organization was implemented. The group dynamics phase was then followed by the action research or evaluation of the change (Burnes, 2012). Unfortunately, there were frequent groups that reverted back to previous behaviors and the changes were not lasting (Burnes, 2012). Lewin changed his theory to include a three-stage process where the last stage of organizational change had a lasting or “freezing” of the change to guarantee that the process of change would stay engrained in the organizational group after the implementation (Burnes, 2012).

Lewin’s theory of change was activated through a three-stage process known as: unfreezing, moving, and then re-freezing (Lewin, 1947a). The three-step process of unfreezing, moving, and then re-freezing moves along in a linear fashion to produce a lasting and successful organizational change (Schein, 1999). During the first step, called unfreezing, the group is identified as having adherence to the past learned behaviors of the organization and this status quo prevents new ideas or behavior from changing the organization or the group (Burnes, 2012).

Lewin recognized that before change could take place, the group needed to be unfrozen or stimulated in such a way to have the ability to change and to recognize the old learned behaviors (Burnes, 2012; Lewin, 1947a). This would allow the group members to break their old
habits and enable them to learn new behaviors or changes in the system or organization but does not signify any control of the process (Schein, 1996). This unfreezing is seen as a necessary part of the change process, but the natural inclination of individuals is to resist change and revert back to their previous behaviors (Schein, 1999). Schein also noted that unfreezing enabled the learning process to begin but did not specifically direct the direction of learning. This could produce anxiety during the unfreezing process, and Schein (1999) described this part of Lewin's theory as having a need to learn to overcome the anxiety of change and learning. Schein explained that Lewin knew that change and learning produced anxiety, and his approach integrated theory to move the group from unfreezing to the movement stage where new learning takes place.

The second stage of Lewin’s change theory is the moving stage. In this stage, there is a movement toward learning the behavior (Burnes, 2012). During the second stage, the leader must assess the learning process and guide the individuals and group toward the goal of change (Burnes, 2012). This incorporates the field theory and group dynamics of change theory into the three-stage change process. In this second stage, a mentor is sometimes used to facilitate the process of learning and provide the group with a safe environment physically and psychologically (Schein, 1988; Van Maanen & Schein, 1979). Once the learning process has shown results, the third step in the change process is implemented.

The third stage of the theory is referred to as the refreezing stage of the change process. During this stage, the new knowledge or behavior is adopted by the group and the dynamics of the group begin to stabilize (Burnes, 2012). When a system or group incorporates a new change, the refreezing sets in place the new change as part of the organization (Burnes, 2012). Lewin encouraged change to be conducted in groups since individual change is difficult to maintain (Burnes, 2012). Although evaluation is ongoing throughout the entire change process, the refreezing stage incorporates the action research and evaluation of Lewin’s previous theory.
The evaluation of the new change is evaluated by the entire group as well as the change agents for refreezing to occur and the change to become permanent (Schein, 1999).

**Application of Theoretical Framework to EBP Project**

The application of Lewin's change theory to this project was, for the most part, due to the organizational change level of the EBP project. Lewin's theory of a three-step process to change an organization or group integrates well with the ARCC© model for EBP practice. Both focus on a system change as opposed to individual practice changes, and the three-step process development seemed to fit the organization. The use of mentors in the learning process or moving stage of Lewin's change theory, as well as the ARCC© model of EBP implementation allows the two frameworks to work together perfectly. Finally, the evaluation stage, or refreezing correlates with the evaluation of the ARCC© model.

**Strengths and Limitations of Theoretical Framework for EBP Project**

The identified strengths of the theoretical framework of Lewin’s change theory are that it was designed for a group change or system change. The three-stage steps are aligned with the EBP model and can be implemented easily to produce a practice change by the organization. The three-stage change is easily adaptable to promote change in an organization. The weakness of the theory is that resistance by the group may prevent the refreezing (Schein, 1999).

**Evidence-based Practice Model**

**Overview of EBP Model**

The EBP model that was chosen for this project was the Evidence-Based Advancing Research and Clinical Practice Through Close Collaboration (ARCC©) Model (Dang et al., 2015). Although there are other EBP models that could have been used for the implementation of this project, the ARCC© model was chosen because of the organization’s readiness to adopt an EBP project. Several staff members had discussed that a significant amount of time each day was spent answering phone calls from patients who had medication or treatment questions.
By implementing a practice change that screened for low health literacy, staffing adjustments, as well as interventions to provide information to low health literacy patients, were implemented. By introducing an evidence-based practice change of health literacy screening, that incorporated interventions to increase antihypertensive medication adherence in low health literacy patients, the project goals attempted to assist patients in achieving better adherence to antihypertensive medications, and therefore, improved patient outcomes.

The ARCC® model’s design and objective was to help organizations and healthcare clinical sites with a guide for developing and implementing evidence-based changes to improve quality and patient care (Dang et al., 2015). The ARCC model was first developed in 1999 by Bernadette Melnyk who formulated this concept as a way to implement EBP in organizations and health care institutions (Dang et al., 2015). However, after using the model to implement EBP practice changes, Melnyk sought to refine the model.

With additional collaboration by Ellen Fineout-Overholt, the model was expanded to include several guiding theories that help to eliminate barriers that were thought to impede the implementation of EBP (Dang et al., 2015). Within the ARCC© model are four assumptions that form the foundation of the model (Melnyk & Fineout-Overholt, 2010). The model’s assumptions are:

- Barriers to adapting EBP exist in health care facilities as well as with individuals.
- In order for EBP to be adopted as a best practice, barriers must first be removed.
- Health care providers and staff must adopt the beliefs and confidence in the importance of EBP in order to fully implement the practice change to EBP.
- Mentors are an integral part of the EBP implementation and are vital to the adoption and the continued success of an EBP system change within a health care facility (Melnyk & Fineout-Overholt, 2010).
One of the changes that took effect with the collaboration of Fineout-Overholt was the use of mentors, usually in the form of APRN's, to help educate and promote the EBP adoption (Dang et al., 2015; Melnyk & Fineout-Overholt, 2010). Mentors are an integral part of the ARCC© model. The mentors provide leadership to facilitate the EBP change (Melnyk & Fineout-Overholt, 2010). In addition, mentors help to identify and implement strategies to eliminate the barriers that prevent the implementation and adoption of EBP change (Melnyk & Fineout-Overholt, 2010).

Along with addition of mentors, the model added components of control theory (Carver and Scheier, 1982, 1998), and concepts of cognitive behavioral theory (CBT) to refine the model and strengthen its use as a change agent for organizations to adopt EBP. The control theory (Carver and Scheier, 1982, 1998) was incorporated into the model to help decrease the barriers that impede the implementation of EBP (Melnyk & Fineout-Overholt, 2010). The existence of barriers can prevent organizations and clinicians from being able to successfully adopt practice changes. Barriers can be found in both individuals and in a health care system (Dang et al., 2015; Melnyk & Fineout-Overholt, 2010).

Another adaptation of the model was the use of the CBT to assist in the adoption of EBP (Melnyk & Fineout-Overholt, 2010). Based on the collaboration with Fineout-Overholt, the model recognized that beliefs could affect the adoption of EBP in an organization (Melnyk & Fineout-Overholt, 2010). The addition of integrating CBT into the model recognized that many factors, including beliefs, can impede the implementation of EBP. Therefore, by integrating key CBT assessments and strategies, the model can determine and strengthen the beliefs of stakeholders to enable successful implementation of EBP (Melnyk & Fineout-Overholt, 2010).

**Application of EBP Model to EBP Project**

The ARCC© model was chosen because of the organization’s small staff size and their professional training. There is one physician, a Licensed Practical Nurse (LPN), and
two medical assistants who participate in patient care. All are health care professionals devoted to their patient population. The initial assessment of the need for the EBP project was met with overwhelming enthusiasm for the implementation of the EBP project. Included in the assessment were key stakeholders, including the office manager, nurse, and medical assistants. After discussing the project with the physician, a mentor-based model was agreed upon as a way to introduce EBP to the office practice. The conversation with the physician and office staff helped to make the determination to use the ARCC© model and solidified the support to proceed with the EBP project. The constructs of the ARCC© model provide direction and support throughout the EBP process. The outline of the model’s steps of EBP moves the process in a simple easy to follow direction toward integration of the system change.

Step one in the ARCC© model implementation is an assessment of the readiness of the clinical site (Dang et al., 2015). This involved the assessment of the organizational culture, the staff acceptance to implementation of EBP, and the organization’s likelihood of relapsing or adopting the EBP after the project (Dang et al., 2015). The initial conversations with staff identified a strong need for screening of low health literacy patients. The response to a system changes that screened for low health literacy and delivered interventions to hypertensive patients with low health literacy screening scores was very positively accepted. The perceived readiness of the staff for EBP and the implementation of an organizational change was evident.

Step two of the ARCC© model was to identify the EBP mentors who will help to implement the project (Dang et al., 2015). The author, a doctoral candidate, was identified as the main mentor to prepare the organization and staff for the implementation of the EBP project. Additionally, the physician, a key stakeholder, understood the importance of EBP and adopting best practices in the clinical setting. The ARCC© model also measured the mentor’s strengths and weaknesses to evaluate the likelihood of a successful outcome. The use of mentors throughout the ARCC© model emphasized the importance of using mentors to successfully implement and adopt EBP in organizations (Dang et al., 2015).
Strengths and Limitations of EBP Model for EBP Project

The identified strengths and limitations of the ARCC© model are included in the critique of the model. Strengths of the model are that it is designed for use in organizations and to implement EBP in organizations (Melnyk & Fineout-Overholt, 2010). It is designed be easily used by clinicians whether or not they have been new in practice or seasoned professionals (Melnyk & Fineout-Overholt, 2010). Utilizing the ARCC© model in EBP integration gives organizations the EBP adoption process.

Limitations were identified as needing further research into the model and the use of the EBP mentor in all of the various health care settings and healthcare organizations (Melnyk & Fineout-Overholt, 2010). Additionally, in order for the ARCC© model to succeed, systems and the individuals within the system need to have some common beliefs or principles or the success of the model may be lessened. The list below describes the principles referred to as tenets, for success.

1. Inquiry is a daily part of the health care environment
2. Quality outcomes are the overall goal;
3. Process exists for the purpose of achieving the best outcomes;
4. Outcome and process data are transparent;
5. Clinicians are autonomous change agents;

If the organization does not hold these beliefs and views regarding EBP, then the ability to have successful change with EBP is less likely to succeed and produce sustained EBP and positive health outcomes for patients (Melnyk & Fineout-Overholt, 2010).
HEALTH LITERACY/ADHERENCE

Literature Search

Sources Examined for Relevant Evidence

To formulate an evidence-based solution to the practice problem of identifying low literacy patients and hypertension medication adherence, a search for evidence was initiated in electronic databases. The search was conducted using specific key words relevant to the topic. Seven databases were searched for relevant evidence as well as background evidence for this project. The databases searched included: The Joanna Briggs Institute EBP Database, The Cochrane Library, CINAHL, Medline containing Full Text articles (via EBSCO), PubMed, Google Scholar, and The Agency for Healthcare Research and Quality (AHRQ). In performing the literature search, keywords were used to search across all databases. The following words were used in the search: hypertension or “high blood pressure” and “medication adherence” or compliance and “health literacy” or “patient knowledge” along with separation of the search terms by Boolean operators OR and AND. The results of the search were limited to the search criteria. Additional limiters used in the search were: scholarly peer review, five years (2013–2018), and English language. The results of the literature search indicated that a significant amount of studies conducted on the subject were done outside the United States. Attempts at using MeSH terms of health knowledge, attitudes, belief* and patient education did not increase the number of results that were relevant for this project.

In total, 247 results were compiled using the databases, search terms, and limiters previously mentioned. The duplicates were documented and sorted to prevent both being chosen. Each article was reviewed by reading the abstract, and if indicated, a full-text review. Articles were discarded if the subject did not include all relevant criteria of health literacy or patient knowledge, medication adherence or compliance and hypertension or high blood pressure. The article was also discarded if health conditions other than hypertension was also researched. Additionally, if the article was based on pharmacist or pharmacological interventions the article was rejected. Further rejections were done if the subject was related to
inpatient hospitalization, urgent care, or other hospital-based settings. There were also articles that were in the results that were irrelevant to the project such as pulmonary hypertension, children with hypertension, pharmacy and pharmacist interventions in hypertension, physician satisfaction, as well as other articles that did not apply to this project. Many articles were rejected for this reason. After reviewing all of the potential pieces of evidence, ten (10) relevant articles were chosen for inclusion as evidence for this EBP project (See Appendix A).

The articles chosen for the literature review were used as the evidence for this EBP project. The details of each piece of evidence were summarized and then a synthesis of the combined literature was presented in this report. The evidence found in the literature search indicated there was an association of low health literacy and the control of hypertension and medication adherence. Therefore, a system change of health literacy screening was found to be evidence-based and an indication of best practice. This project implemented a system change to screen for health literacy in the practice setting and to provide additional educational support to patients with low health literacy. The additional education interventions were provided to increase antihypertensive medication adherence.

Levels of Evidence

Level I Evidence

Slade (2017) authored a Joanna Briggs Institute (JBI) Evidence Summary to find out if the current evidence indicated there was an association of low health literacy and hypertension control. The clinical question sought to answer whether low health literacy in hypertensive patients resulted in poor medication adherence and poor management of hypertension. The evidence summary included four studies that were reviewed. The reviewed evidence within the JBI evidence summary is included in this literature review.

The first study reviewed by Slade (2017) for the evidence summary was by,
McNaughton, Kripalani, Cawthon, Mion, Wallston, & Roumie (2014). A cohort study was designed and a Brief Health Literacy Screening (BHLS) was used as the instrument to measure health literacy. A recorded score of nine or less indicated the patient had low health literacy. In addition, blood pressure reading was measured and recorded. The parameters of elevated blood pressure were readings above 140/90 mmHg for patients or 130/80 mmHg for patients with chronic kidney disease (CKD) or diabetes. In this study, elevations in blood pressure were recorded in low health literacy scoring patients (40.0% vs. 35.5%; with an adjusted odds ratio [aOR] 1.06; 95% confidence interval [CI] 1.01-1.16) for hospitalized patients. The findings also noted that low health literacy was associated with extreme blood pressure readings above 160/100 mmHg (aOR 1.08; 95% CI 1.01-1.16). Low health literacy was associated with elevated blood pressure in patients without confirmed hypertension diagnoses (aOR 1.09; 95% CI, 1.02-1.16) The findings concluded that low health literacy was associated with increased blood pressure measurements.

The second study reviewed for the evidence summary was an observational study by Pandit, Tang, Bailey, Davis, Bocchini, & Persell (2009). The study was conducted in safety net clinics in the U. S. The researchers concluded that literacy limitations were correlated with poor hypertension control (AOR 2.68, 95% CI 1.54-4.70) which indicated that there was an association between literacy/education and hypertension knowledge, outcomes, and control.

In the third study by Ko, Balasubramanian, Wong, Tan, Lee, ... Tang (n. d.) was a cross-sectional survey that examined whether there was an association between health literacy and controlled hypertension. The study relied on one blood pressure measurement to conclude health literacy was not associated with hypertension control.

In the final study reviewed for the evidence summary, Shi, Li, Wang, Wang, Liu, Shi, ... Chen (2017) performed a cohort study that examined if there was an association between
hypertension management and low health literacy. The conclusions of the study found that there was a significant association between health literacy and systolic blood pressure. Participants with higher literacy scores had better control of their hypertension.

The conclusions of the evidence summary were that health literacy improvements are integral parts of hypertension management. Interventions to improve health literacy should be considered best practice in the treatment of hypertension.

**Level II Evidence**

Gwadry-Sridhar et al. (2013) performed a systematic review to find out if intervention improve antihypertensive medication adherence and blood pressure control. In this study, a literature search was conducted for inclusion of articles published between 1979–2009. Databases that were searched included: CINAHL, EMBASE, MEDLINE and all EBM reviews. In addition, the search focused on study design sample, blood pressure, and measurements of adherence. The initial literature search identified 138 articles. After careful review by the researchers, 97 articles were included in the review. The majority of the studies, (59.8%) were from random control studies (RCT). The other studies included in the review included: cohort, cross-sectional, and open-label studies. Sample sizes of the reviewed literature ranged from 2 to 15,519; interventions were analyzed for statistical significance. The articles that were included in the review varied from direct interventions to target medication adherence (36.1%) to a combination of strategies. These included interventions from health care providers, multidisciplinary team approaches, pharmacist interventions, and other direct improvements to increase patient adherence. Of these articles with direct improvements to increase adherence, (45.7%) showed a statistically significant impact on the adherence of antihypertensive medication and blood pressure control. Interventions that focused on improving adherence with the assistance of a provider or team of health care workers, (32.6%) had a statistically significant impact on adherence.
The authors of the review noted that most of the articles contained nonpharmacologic interventions. Only two studies contained interventions that included pharmacological items. The majority contained several items in the intervention including education and other strategies such as: handouts, support groups, reminders, packaging, diaries, tele-management, and interviews. The education-based interventions showed statistically significant results in the adherence rate or reduction of blood pressure (48%).

The systematic review findings provide good evidence to show that patient education has a statistically significant effect on the medication adherence and management of hypertension. The items that were described included pamphlets, personalized communications, and interventions that help to increase patient knowledge. The findings suggest that increasing knowledge helps to improve hypertension control and medication adherence.

**Level III**

Ghembaza et al., (2014) conducted a cross-sectional study on a representative sample of 453 hypertensive participants. The study was conducted in Tlemcen, Algeria. This study examined the association between patient knowledge of the complications that are associated with hypertension and antihypertensive medication adherence. Additionally, the researchers sought to see if antihypertensive medication adherence was associated with a participant’s social or demographic characteristic.

The study was conducted from May until November 2013. The researcher’s computation calculated that a sample of 354 participants was needed for the study to reflect the current adherence rate of antihypertensive medications in Tunisia. The participants were randomly chosen to be mailed questionnaires. Additional questionnaires were disbursed to obtain an adequate sampling. Subjects were included with the following conditions: they must be 18 years of age, taking at least one antihypertensive medication for at least three months, and participants must be residents of Tlemcen for the past three months.
A Girerd adherence scale was used to assess antihypertensive medication adherence. An additional questionnaire collected demographic data to assess the inquiry of socio-demographic considerations in medication adherence. The obtained information was statistically analyzed using SPSS and descriptive analysis was performed on the characteristic data.

The response rate of the questionnaire was calculated at 98%. Of the participants in the study, 161 (35.50%) were adherent to antihypertensive medications. Most (73.7%) of the participants stated they were aware of the complications of hypertension. Of the participants, 71.3% had a low education or were uneducated. Eighty-three-point six percent of the participants took less than three antihypertensive medications. The findings were analyzed to show that knowledge of hypertension complications was significantly associated with an increase in medication adherence (P<0.004), OR=0.493(0.307-0.791). However, there were two statistically significantly factors that produced decreased adherence to antihypertensive medications which were comorbidities (P<0.006), OR=1.79(1.186-2.702), and taking multiple antihypertensive medications (P<0.013), OR=1.392(1.074-1.803).

The findings of this study support the association of patient knowledge of hypertension to the adherence of antihypertensive medications. Of particular note, the patients who had comorbidities were twice as inclined to non-adherence of their blood pressure medications. This finding was also noted in past studies. In addition, the findings that multiple antihypertensive medications decreased adherence is a factor that providers should discuss with patients.

Halladay et al., (2017) conducted a non-randomized cohort study of 525 participants with hypertension that was classified as uncontrolled systolic blood pressure (SBP) greater than 140 mmHg, and who had an SBP equal to or greater than 150 mmHg systolic recorded at their last primary care visit. The purpose of this study was to assess if there were quality improvement interventions aimed at lowering systolic blood pressure and if those interventions would have a greater impact on lower literacy populations.
Of the 525 participants, 493 completed the Short-test of Functional health Literacy in Adults (STOFHLA) to participate in the study. Interventions were introduced to the health care providers to implement and throughout the clinic for all patients during the period of data collection. The intervention period took place over a two-and-a-half-year time period. Interventions were both practice focused, and patient focused. The multiple interventions allowed the researchers to gather information during the study period. Practice level interventions included: patient education with videos, dinner meetings, interventions using "plain language" in communications, and teach back techniques. Patient level interventions included: phone coaching, mailing information, home blood pressure monitoring, and diaries.

The results of the study found that 23% of the participants were classified as low literacy. Of these, 58% were African American, and 31% were male. In addition, the low literacy population was generally an older population (64.8 vs 54.7 yrs, P<0.00001), were more African American (77% vs 52% p<0.001). The SBP mean in the low literacy group was 144 mmHg (SD23) compared with 138 mmHg (SD 21) in the higher literacy population. After one year, both the low literacy and the high literacy groups had decreases in SBP, 5.6mmHg (p<0.00001), (6.6mm Hg and 5.3mm Hg) but there was not a statistically significant difference (1.3 mmHg, P=0.067) between the low literacy group and the high literacy group.

Although the study findings did not show a statistically significant decrease in SBP between the high and low literacy participants, the effects of the interventions appear to have helped decrease the SBP in both high and low literacy participants. Using multiple strategies as interventions including patient education and focusing on health literacy provides this EBP project with additional evidence for a practice change.

Ingram and Ivanov (2013) conducted a descriptive correlational study to examine if health literacy impacts medication adherence in African American elderly patients. The convenience sample of N=121 African American adults over the age of 50 with hypertension were on prescription medication or lifestyle modification therapy. The purpose of the study was
to examine the association of health literacy and antihypertensive medication adherence in African American elderly persons.

Participants were aged 50-87 years of age (mean = 59.75; SD = 7.94). Seventy percent were educated below the 12th grade. Eighty eight percent had incomes below $20,000 per year. Many of the patients, more than 50%, were diagnosed with hypertension for five or more years. The REALM health literacy tool and the Hill-Bone Compliance Scale (HBCS) were used to measure the level of health literacy and rates in medication adherence.

The adherence rates for the sample population showed that 51% of the participants were not adherent with antihypertensive medication regimens. The REALM scores for health literacy mean was 46 with scores in the range of 0 to 66. Thirteen percent of the participants scored at a third-grade level or below. A little more than half (55%) of the participants scored in the moderate literacy range which indicates a fourth to eighth grade reading level.

The findings of this study found statistically significant factors regarding age and medication adherence (r = -0.249, p<0.05) indicating that increased non-adherence is found in younger participants. Less educated also had greater non-adherence rates (r = -0.200, p< 0.05) along with participants who identified with poor health (r=-0.267, p<0.01). Although most of the participants REALM scores indicated a low health literacy, unexpectedly, the authors stated that there was no significant association found between medication adherence and health literacy, (no r score data p<0.05). However, the statistically significant factors of lower education levels and higher rates of non-adherence to antihypertensive medications supports the EBP project of developing a practice change to screen for literacy and provide patient education at a lower literacy or education levels to increase antihypertensive medication adherence.

Jankowska-Polańska et al. (2016) conducted a descriptive cross-sectional survey design to examine and investigate whether there was a relationship between patient knowledge and adherence to antihypertensive medications. The study recruited 233 participants between 32 and 90 years of age who were diagnosed with hypertension. The participants were also
screened and selected if their hypertension included treatment for at least one year with at least one antihypertensive medication and an established history in the health center for a minimum of six months. The study took place at the Kosmonautów health center in Wroclaw, Poland.

Patients consented to participation and were administered a Hypertension Knowledge Level Scale (HK-LS) to assess their knowledge about hypertension. Depending on the score, the participants were separated into two groups, those whose score detected a low level of knowledge about hypertension and those whose score detected a high level of patient knowledge about hypertension. One hundred forty-seven participants were categorized as having low levels of hypertension knowledge. Eighty-six participants were found to have high levels of patient knowledge about hypertension.

In addition, the assessment of antihypertensive medication adherence was conducted through a self-reported Morisky Medication Adherence Scale (MMAS-8). The scores are 0-8 with less than six indicating poor adherence, 6-8 medium adherence rates, and a score of 8 indicating high adherence to antihypertensive medications. The scoring for the HK-LS is as follows: less than or equal to 17 represents a low-level knowledge about hypertension and 18-22 indicates a high level of knowledge.

The results of the study indicated that 63% of the participants scores represented a low level of knowledge regarding hypertension (147 vs 86). Many of the low knowledge participants also lived alone (83.7% vs 15.1%; P= 0.045). The participants in the low knowledge group had significantly more low adherence rates (19.7% vs 8.1%; P= 0.038).

The findings from this study indicate that low levels of knowledge regarding hypertension affects the management and treatment of hypertension. An important factor in the management of hypertension control is patient knowledge and education. Since patients with higher levels of knowledge about hypertension exhibited higher adherence rates, increasing patient knowledge regarding hypertension supports this EBP practice project.
McNaughton, Jacobson, and Kripalani (2014) sought to examine the association of low literacy and its effects on uncontrolled hypertension and non-adherence to anti-hypertensive medications. The cross-sectional study obtained information that was collected from a recent year-long randomized controlled trial (RCT). The RCT data were analyzed to obtain the study findings. The researchers analyzed 423 urban patients with hypertension and coronary artery disease (CAD) in Atlanta, Georgia.

During the yearlong RCT, patients were interviewed, and data were gathered regarding cognitive function, health literacy using REALM health literacy screening tool, and a self-reported medication adherence scale (ARMS) were analyzed. One hundred ninety-two (45.4%) of the participants produced scores that indicated a low literacy score, which indicates at or below a 6th-grade reading level. Two hundred thirty-one of the participants produced scores that indicated a marginal or adequate literacy level. The demographics of the participants included 237 (56%) female. Three hundred eighty-seven or (92%) were African American. One hundred ninety-five (46%) had diabetes. Measurements of blood pressures in the two groups showed that 78 (41%) of the low literacy participants and 118 (51%) of the adequate literacy participants achieved adherence and controlled hypertension. The authors’ findings showed an association between low literacy and uncontrolled hypertension (OR 1.53 95% CI 1.04 - 2.25) as well as in the three regression models. However, in this study, higher health literacy scores were associated with less medication adherence in patient reported results.

The results of the study concluded that low literacy was associated with higher patient reported medication adherence. The original RCT was designed to improve medication adherence with interventions to increase adherence. Although the study did not find that low literacy was associated with patient reported medication adherence rates, it did find that lower health literacy rates were associated with uncontrolled hypertension. Furthermore, the study results did not conclusively find an association between low health literacy and medication compliance, the study did recognize that the antihypertensive medication adherence information
was based on patient medication refills and patient reported adherence. The authors also noted that alternative adherence measurements may be helpful to accurately determine the medication adherence rate and the association to low health literacy. The association of low health literacy rates with uncontrolled hypertension support the evidence to implement a health literacy screening to identify patients who can benefit from additional patient education interventions.

Wannasirikul et al. (2016) conducted a cross-sectional survey design study to examine whether health literacy as well as cognitive, social, and cultural factors have an effect on hypertension medication adherence. The sample size was 600 Thai patients in the Sa Kaeo Province, Thailand. The response rate to the survey was 100%. There were 145 male participants and 455 female participants. All participants were over the age of 60. The study questionnaire assessed demographics, literacy, cognitive ability, culture and society, health literacy, and medication adherence along with a blood pressure measurement.

The results showed that literacy had a direct effect on health literacy ($\beta=0.46$), followed by cognitive ability ($\beta=0.22$) and culture and society ($\beta=0.11$), ($p<0.05$). Health literacy had a direct effect on medication adherence ($\beta=0.08$) but not as much as cognitive ability ($\beta=0.52$) ($p<0.05$). Health literacy was the most significant factor on blood pressure levels ($\beta=-0.14$, $p<0.05$). Not surprisingly, the largest total effect on health literacy was literacy.

The findings support the evidence that a lack of patient knowledge increases non-adherence to antihypertensive medication therapy. The conclusion of this study recommends health education for older adult patients to include: (a) education, and creating a learning environment; (b) written communications, (c) evaluations for health literacy and cognitive ability; and (d) evaluation of comprehension levels to improve health literacy.

**Level V**

Hu (2016) wrote a review that included factors affecting the adherence of antihypertensive medications and the strategies that may help to alleviate the problems of non-
adherence. Hu stated that poor adherence contributes to uncontrolled hypertension. The uncontrolled hypertension caused by non-adherence is responsible for causing death, disability, and increased costs of hospitalizations and cardiovascular complications.

Although there are many barriers to adherence, some patient factors included low health literacy and lack of knowledge. In addition, there were other factors noted such as, depression, cognitive deficits, and poor social help. Patient factors that prevent adherence were thought to be mediated or lessened by system and provider strategies and interventions that could increase patient knowledge and awareness.

The review stated that health care providers should focus on providing patient-centered interventions to attempt to improve adherence. Using communication techniques that can assist patients’ knowledge and understanding of hypertension are part of the provider’s responsibility to increase medication adherence. The review highlights that health literacy and medication instructions, patient understanding of complications or misperceptions of the medications use or side effects can further contribute to non-adherence. The conclusion of the article emphasizes that providers should communicate with patients at all visits about medication adherence. The recognition of barriers that could contribute to non-adherence and decreased understanding should also be assessed.

Roldan et al. (2018) produced a U. S. Government work that reviewed forty-four studies with various interventions for improving antihypertensive medication adherence using EBP standards in care. The review highlighted that adding evidence-based interventions can improve patient outcomes including medication adherence to antihypertensive medications. The findings of the review indicate that there are multiple factors that can impact medication adherence. These factors include: (a) patient knowledge, (b) support systems, (c) socioeconomic status, including health literacy; (d) education, (e) income, (f) medication intolerance, (g) provider communication, (h) relationships with providers, (i) access to
medications, and (j) the need for the development of educational strategies, that include multidisciplinary, and culturally sensitive care.

This review highlights many of the interventions that can help to increase medication adherence to antihypertensive medications. The results of this review support the need for interventions that increase patient knowledge and communication, and improve antihypertensive medication adherence. This evidence supports the proposed EBP project and contains findings that are consistent with other presented evidence.

Appraisal of Relevant Evidence

The Johns Hopkins Nursing Evidence-Based Practice Evidence Level and Quality Guide was used to rate the hierarchy of the evidence in this EBP project (Dearholt & Dang, 2012). The studies were reviewed for content and quality and assigned evidence levels. The evidence levels are ranked in a five-category rating system with level I, determining strong evidence and level V, displaying a lesser level of evidence in the rating scale. For evidence not listed in the John Hopkins Nursing Evidence-Based Practice Evidence Level and Quality Guide, Melnyk and Fineout-Overholt (2015) and Schmidt and Brown (2015) hierarchy of evidence levels were reviewed.

The Johns Hopkins Nursing Evidence-Based Practice Evidence Level and Quality Guide was also used to assess the quality of the reviewed evidence (Dearholt & Dang, 2012). The quality ratings are assigned an A, B, or C to designate the level of quality that the reviewer has determined the evidence within the study to contain. A quality rating of A determines a high quality study with a well-designed study, adequate sample, controls to minimize error, and logical transferrable results. A quality rating of B determines the study to be of good design with an adequate sample and good conclusions. The level of C is determined to have questionable results or inadequate sample size to determine a higher level of quality. Level C quality is of lesser quality and therefore the conclusions may be questioned, and results may be determined to be non-transferable.
Construction of Evidence-based Practice

Synthesis of Critically Appraised Literature

The literature contained in this review supports and confirms the need for an evidence-based project that implements a system-based practice change of screening patients for health literacy. Health literacy has been identified as an important factor in managing hypertension (Slade, 2017). Additionally, low literacy has been associated with uncontrolled hypertension (Gwadry-Sridhar et al., 2013; Halladay et al., 2016; Hu, 2016; Jankowska-Polańska et al., 2016 McNaughton et al., 2014; Slade, 2017). Low health literacy or patient knowledge has also been associated with non-adherence to antihypertensive medication (Ghembaza et al., 2014; Hu, 2016; Jankowska-Polańska et al., 2016; Roldan et al., 2018; Wannasirikul et al., 2016).

Patients with low health literacy or limited knowledge of hypertension have been found to benefit from provider education (Roldan et al., 2018). Educational interventions that focus on patient-centered and culture care interventions have been shown to increase adherence to antihypertensive medications (Hu, 2016; Roldan et al., 2018). Several studies identified the association of low health literacy/hypertension knowledge is related to medication adherence (Gwadry-Sridhar et al., 2013; Ghembaza et al., 2014; Hu, 2016; Jankowska-Polańska et al., 2016; Roldan et al., 2018; Wannasirikul et al., 2016). The systematic review by Gwadry-Sridhar et al. (2013) stated that increasing patient knowledge had the greatest effect on increasing adherence to antihypertensive medication. It is therefore important to assess barriers such as the health literacy of patients and patient adherence to antihypertensive medications at each provider encounter (Hu, 2016). Office interventions, such as person-centered communication techniques, are interventions that can help to increase patient understanding and decrease barriers associated with medication adherence (Ghembaza et al., 2014; Gwadry-Sridhar et al., 2013; Hu, 2016; Jankowska-Polańska et al., 2016; Roldan et al., 2018; Wannasirikul et al., 2016).
Although (Halladay et al., 2016) used health literacy screening information to identify low literacy participants, the results did not show statistically significant evidence between low literacy and high literacy participants. The researchers concluded that multiple interventions given to both groups of participants were effective in improving the control of hypertension in both the high health literacy and low health literacy groups.

Best Practice Model Recommendation

The best practice recommendation was based on the evidence collected, to develop an evidence-based practice change that recognizes the impact that health literacy has on medication adherence. Implementing a practice change of health literacy screening to improve the medication adherence of hypertensive patients has been identified as a best practice. Health literacy screening assists providers in recognizing patients that may benefit from additional educational interventions. Interventions to improve the health literacy of patients is important to hypertension control and management. Providing interventions including open communication, patient-centered care, patient education, and written information at a low reading level, have all been described as increasing antihypertensive medication adherence (Gwadry-Sridhar et al., 2013; Hu, 2016; Roldan et al., 2018). Therefore, the evidence presented in the literature review provided the basis to develop this evidence-based practice project to implement a system change of screening for health literacy. The office practice implemented health literacy screening and the provider integrated additional interventions to assist low health literacy patients in increasing antihypertensive medication adherence.

How the Best Practice Model will Answer the Clinical Question

Implementing a system practice change to screen patients for health literacy was supported by evidence and was identified as a way to identify patients who require additional interventions to increase patient knowledge and understanding about medication adherence. By identifying patients with low health literacy, additional information and educational
opportunities can be provided to improve adherence to antihypertensive medications.
CHAPTER 3
IMPLEMENTATION OF PRACTICE CHANGE

Participants and Setting

This project was implemented in a Northwest Indiana Internal Medicine private practice. The office serves the communities of Northwest Indiana and extends to the nearby state of Illinois for some patients. Patients are mostly Medicare and Medicaid insured patients, along with many private insurance patients. The patient mix is primarily adults over age 40, and is a mix of ethnic, racial and socioeconomic demographics.

Many of the patients seen in the clinic have hypertension and additional comorbidities such as diabetes mellitus (DM), coronary artery disease (CAD), chronic heart failure (CHF), chronic kidney disease (CKD), obesity, and peripheral vascular disease (PVD). Management of multiple comorbidities takes additional office time. Routinely, office visits can exceed 45 minutes to review patient testing, conduct patient interviews, and perform comprehensive physical examinations. The physician is well acquainted with his patients, their health conditions, and their families.

The values of the physician practice are that the patients feel comfortable at the office and are well-known to the office staff and the physician. Although the practice is very professional, the caring nature of the physician and staff are conveyed to patients and families during their visit. Many patients and family members voice their faith and confidence in the physician and the staff during office visits.

The EBP project of screening for health literacy was enthusiastically received by the office practice, and particularly by the office staff who spend additional time on the telephone with patients. The project goal that low health literacy patients might benefit from additional education while in the office was recognized as a current need in the practice (B. Austin, M.A., personal communication, May 15, 2018).
Outcomes

This EBP project had a main outcome to implement a system change of health literacy screening to increase medication adherence in low literacy patients. The practice currently does not screen for health literacy; therefore, the project initiated the system change of the organization. This included the ability of the organization to adopt the REALM-SF health literacy screening program and accompanying policy for the patients in the practice. The DNP student led the implementation of the practice system change and recorded the outcomes of the health literacy screenings as well as the additional screenings and interventions to measure and increase antihypertensive medication adherence in low literacy participants.

The outcome that was chosen to be implemented and evaluated was based on a literature review of current evidence. Slade (2017) JBI evidence summary concluded that screening for health literacy should be considered to be a best practice indicator in the management of hypertension. With further evidence to indicate that health literacy screening system changes would help to identify patients who may need further education to increase antihypertensive medication adherence, the EBP project was designed to increase medication adherence in low literacy patients with hypertension and thereby improve patient outcomes in hypertension control.

In addition to the system change of implementing a screening of patients for health literacy, this EBP project assessed antihypertensive medication adherence. Hu (2016) addressed the need for all providers to integrate adherence questioning in all encounters. Additionally, patients who have barriers such as low health literacy, may need additional education and support (Hu, 2016; Roldan, 2018).

Intervention

The system-based implementation to identify low literacy patients with health literacy screening, was identified as a best practice implementation in the care of patients with hypertension (Slade, 2017). Patients who presented to the clinic who were 18 years or older,
were given information about the EBP project when they arrived for their appointment. The patients were told the project was voluntary and participation or the decline to participate would not affect their ability to receive health care in the clinic practice. The patients who agreed to participate in the EBP project were given an informed consent to participate (See Appendix B) and confidential demographic forms (See Appendix C). All staff were educated on the participant’s right to withdraw from the EBP project, and, specifically, that participants could terminate their participation at any time, including after informed consents were signed. Patients who agreed to participate, and signed informed consent forms, were then referred to as participants. The REALM-SF health literacy screening test (See Appendix D) was administered to the participants, to assess their health literacy status. Participants who scored less than seven (7), who also have hypertension, were then given the Hill-Bone HBP Compliance Scale (See Appendix E) to assess their adherence to antihypertensive medications. Participants who had low health literacy, and who also had hypertension, were then provided person-centered interventions of additional educational support including, an easy-to-read handout (See Appendix F) and verbal communications aimed at increasing adherence to antihypertensive medications. The educational items provided to low literacy participants has been suggested as an effective tool in helping to increase antihypertensive medication adherence. Approximately four weeks after providing additional education on hypertension and medication adherence, a Hill-Bone HBP Compliance Scale post-test (See Appendix G) was obtained in person or by telephone to assess any changes in medication adherence of antihypertensive medications.

Planning

This EBP project was researched and developed for a planned system change to screen patients for health literacy in a private practice setting. The screening of health literacy has been associated with use in identifying patients who may need additional information or interventions to help increase adherence to antihypertensive medications (Hu, 2016; Wannasirikul, 2016).
Health literacy screening has also been indicated as a best practice recommendation in managing hypertension (Slade, 2017).

With evidence to guide the development of this EBP project, the doctoral student conceived the project to screen for health literacy and provide educational interventions on medication adherence to the low health literacy participants who have hypertension. The EBP project was a system change for the office practice, and the Lewin change theory guided the change process. The Lewin change theory has three stages to organizational change, which were used to bring about the project’s system change (Burnes, 2012). The office staff and physician voiced enthusiasm and all stakeholders supported the implementation of the project.

**Data**

Health literacy screening scores were conducted from the REALM-SF (See Appendix D) to assess the literacy of health-related information. Permission was granted for use of the REALM-SF from Dr. Terry Davis. The use of a tested and reliable instrument to collect participant data was supported by the evidence collected for this EBP project. Patients who chose to consent to participate in the project were given the REALM-SF while privately meeting with the nurse for intake information related to the visit. The additional collection of demographic data, obtained from participants, and project data were collected, coded, and stored in a lock box for the protection of participant privacy.

The Hill-Bone HBP Compliance Scale (See Appendix E) permission for use was obtained prior to project implementation from the Johns Hopkins School of Nursing by Yvonne Commodore-Mensah PhD, RN. The Hill-Bone HBP Compliance Scale has been used extensively and is a well-documented instrument for collecting data. The Hill-Bone Compliance Scale was given to those participants who have hypertension, and whose health literacy screening score was less than seven (7). The Hill-Bone HBP Compliance Scale was given before the person-centered educational information was given to the participant, and the Hill-
Bone HBP Compliance Scale was repeated approximately four weeks after the educational information was given to assess any change in antihypertensive medication adherence.

Measures

The health literacy screening with the REALM-SF has been studied, verified, and found to be an effective screening tool for determining the health literacy of participants (Arozullah et al., 2007). An additional study verified the validity of the tool in health literacy screening (Jordan, Osborne, & Buchbinder, 2011).

The Hill-Bone HBP Compliance Scale has been studied, verified and found to be a reliable and valid tool to measure blood pressure medication compliance (Kim et al., 2007; Kim, Hill, Bone, & Levine, 2000; Lambert, Steyn, Stender, Everage, & Fourie, 2006). The adherence scale will be administered before giving educational materials and approximately four weeks after receiving education about hypertension and medication adherence.

Collection

The collection of data was obtained during the participant’s scheduled office visit. The patient was asked if he or she would agree to participate in the EBP project and complete an informed consent (See Appendix B). Demographic data (See Appendix C) was obtained from the patient’s completed form and additional data were obtained from the patient’s medical record.

The REALM-SF health literacy screening tool was used to evaluate the patient’s health literacy score (See Appendix D). In participants whose health literacy score was below seven, additional data collection was performed through the administration of the Hill-Bone HBP Compliance Scale (See Appendix E). The data were collected prior to the delivery of educational materials both written and verbal to assist in increasing medication adherence of antihypertensive medications. Approximately four weeks post education delivery, the participant was contacted by phone, or at a subsequent office visit to be interviewed with a second Hill-Bone HBP Compliance Scale for evaluation of the patient’s HBP medication adherence. If the
participant was unable to be contacted by phone, three additional attempts were made to contact the participant before the maximum four-week contact time period.

**Management and Analysis**

The screening evaluation with the REALM-SF health literacy screening tool was performed in the office during the intake process by the office nursing staff. In addition to the health literacy screening score, patient demographic data were collected as well as chart information regarding co-morbidities and diagnoses for additional analysis. The participants whose health literacy score was below seven and who had a diagnosis of hypertension, were given the Hill-Bone HBP Compliance Scale to assess medication adherence. Approximately four weeks after the educational material was given, a second Hill-Bone HBP Compliance Scale was administered by telephone or during the next office visit when possible.

In order to protect the participant data, all pages of participant data were numerically coded. The use of numerical codes removed participant names from demographic and screening data. The participant data was removed daily from the clinic to further protect the privacy of the participants. The data were kept in a locked safe at the home of the DNP student. The demographic, screening, and compliance data were coded and entered in IBM SPSS statistical software for analysis.

**Protection of Human Subjects**

When patients signed in for their appointment, all patients were asked to consent to participate in the EBP project and be screened for health literacy. The consents were voluntary, and the staff was instructed to abstain from coercion or enticement of any kind. All persons assisting in the EBP project were instructed on how to conduct an ethical project. Protecting the practice’s patients and the participants, if they decide to consent to participate, was the primary responsibility of this EBP project. The DNP student was the author of this project and was the principle guide in the implementation of this EBP project system change, she completed the NIH
course on the protection of human research participants twice in the past four years. The project was submitted to the Valparaiso University Institutional Review Board (IRB) and was approved.
CHAPTER 4

FINDINGS

This evidence-based practice project implemented a health literacy screening program using the REALM-SF health literacy screening tool in a Northwest Indiana Internal Medicine practice. The project looked to identify low literacy participants with hypertension. Those participants with low literacy and hypertension were given a Hill-Bone HBP Compliance Scale to determine antihypertension medication adherence. Interventions were then given to the patient in the form of easy-to-read handouts and person-centered communication to increase antihypertensive medication adherence. A follow-up Hill-Bone HBP compliance scale was conducted approximately four weeks post intervention. The content to follow, contains the data analyses of participant demographics and REALM scores as well as the pre and post Hill-Bone HBP Compliance Scale scores for low literacy participants.

Participants

Size

This evidence-based practice project enrolled a total of 67 participants over the age of 21. The size of the sample was obtained over the eight weeks of the project implementation. Of the 67 participants who agreed to participate, two participants were lost to attrition. The final sample was 65 participants.

Characteristics

The individuals consisted of 40 (61.5%) females and 25 (38.5%) males. The age range of the participants was 35 to 86 years old. The average age range of participants was 66-74 years with the mean age of 65 years (See Appendix F). The educational attainment of the sample population (See Appendix H) consisted of 38.5% high school or GED education; 24.6% reported to have a 4-year college degree, 20.0% some college, 7.7% graduate degree, 4.6% less than high school, and 4.6% refusing to answer. Ethnicity identification data were analyzed
showing (a) non-Hispanic white 40 (61.5%), (b) Black (African American) 14 (21.5%), (c) Hispanic 6 (9.2%), (d) Asian 1 (1.5%), (e) refused to answer 4 (6.2%) (See Appendix I). The insurance coverage of the participants was as follows, (a) Medicare 61.5%, (b) employer provided 26.2%, (c) refused to answer 6.2%, (d) HIP/Obamacare/Self-insurance 3.1%, (e) Medicaid 1.5%, and (f) no insurance 1.5%.

Additional demographic data were collected for analysis. The data included income level and county of residence. The income demographic data were collected, however 27.7% of the participants refused to answer the income level question. The majority of the participants resided in Lake County Indiana 73.8%, followed by Porter County, Indiana 10.8%, Jasper County, Indiana 6.2%, other 3.1%, and 6.2% did not answer the question.

The REALM-SF health literacy screening tool has been found to be an effective screening tool (Arozullah et al., 2007), with good validity. In addition, (Jordan et al., 2011) also verified the validity of the screening tool. The Hill-Bone HBP Compliance Scale has also been found to be an effective tool to measure antihypertension medication compliance. The Hill-Bone HBP Compliance Scale was also researched for validity and reliability and found to be a valid and reliable instrument (Kim et al., 2000; Lambert et al., 2006).

The REALM-SF health literacy screening tool was given to the 65 participants. The data were analyzed, and the results of the REALM-SF scores are as follows, (a) 90.8% scored 7, (b) 3.1% scored 5, (c) 3.1% scored 4, (d) 3.1% scored 3 or less, and (e) 0% scored 6. A total of six (6) participants scored less than seven (7) on the REALM-SF. The Agency for Healthcare Research and Quality (AHRQ) published the scoring interpretation of the REALM-SF screening test as follows:

- Score of seven (7) reads at a high school level, able to read patient educational materials
• Score of four-six (4-6) reads at a seventh to eighth grade reading level. May struggle reading patient educational material and is not insulted by material written a low-literacy level.

• Score of one to three (1-3) reads at a fourth to sixth grade reading level. May be unable to read prescription medication directions.

(AHRQ, 2018)

Of those who scored less than 7 on the REALM-SF, the age range of the REALM-SF low literacy scores were all over the age of 55 (See Appendix F). All REALM-SF participants who scored below seven were given a Hill-Bone HBP Compliance Scale. The Hill-Bone HBP Compliance Scale (pre-test) was then given prior to the intervention of giving person centered educational information on antihypertensive medication adherence and the distribution of an easy-to-read handout about high blood pressure.

Changes in Outcomes

Statistical Testing

Statistical testing was conducted using IBM SPSS Statistical software version 25. The main focus of the statistical analysis was to determine if the answer to the PICOT question was statistically significant when comparing the pre and post Hill-Bone HBP Compliance Scale scores. A paired t-test was performed to analyze the pre and post scores. Additionally, descriptive statistics were used to analyze the characteristics of the participant population and the low literacy participant population. A chi-square test was performed to analyze the sample for independence. The chi square testing found that there was no statistically significant difference between the participant sample and the low literacy group on gender ($p = .301$), education ($p = .426$), insurance ($p = .870$), income ($p = .747$), county of residence ($p = .629$) and age range ($p = .488$). There was a statistically significant difference between the participant sample and the low literacy group on ethnicity ($p = .017$). Finally, paired sample t-tests were conducted on specific questions of the Hill-Bone HBP Compliance Scale to evaluate the
statistical significance of pre and post questions regarding medication adherence (See Appendix G).

**Significance**

The statistical unit used for significance in all of the analysis performed was $p < .05$. Using a t-test to determine statistical significance, the test revealed that no statistical significance was found between the pre-Hill-Bone HBP Compliance Scale and the post-Hill-Bone Compliance Scale totals. The pre-test mean score of 50.50 ($SD = 5.08$) compared to the post-test mean score of 52.83 ($SD = 1.94$) after the interventions were given to low literacy participants to attempt to increase antihypertensive medication adherence, $N = 6$, $t(5) = -1.688$, $CI = -5.88 – 1.22$, $p = .152$ (See Appendix G).

In addition to looking at the total of pre and post Hill-Bone HBP Compliance Scale for statistical significance, questions which pertained specifically to medication adherence were analyzed. These questions were all found to have no statistical significance. Additionally, non-parametric Wilcoxon Signed Rank Testing was conducted on the pre and post total Hill-Bone HBP Compliance Scale scores, which also indicated that there was no statistical significance between pre and post Hill-Bone HBP Compliance Scale scores.
CHAPTER 5

DISCUSSION

The purpose of the EBP project was to implement an organizational change of health literacy screening to an internal medicine practice. Additionally, the EBP project sought to identify low literacy participants who have hypertension, and to deliver interventions aimed at increasing antihypertensive medication adherence. Although the project findings showed improvement in antihypertensive medication adherence, the results were not statistically significant. The purpose of implementing the EBP project was to answer the PICOT question which stated: In adult patients with hypertension, does health literacy screening, along with patient-centered interventions, as opposed to the office standard practice, increase medication adherence in patients with low health literacy? Although the project did not show statistically significant findings, there was improvement in the post Hill-Bone HBP Compliance Scale scores. This chapter discusses the project findings as well as the evaluation and implications for future practice.

Explanation of Findings

Data collected during this EBP project were obtained utilizing demographic forms, REALM-SF screening tool, and pre and post intervention Hill-Bone HBP Compliance data for analysis. The information was analyzed using IBM statistical analysis software SPSS version 25. The data that were analyzed included patient demographics, REALM-SF health literacy scores, and the Hill-Bone High Blood Pressure Compliance Scale. Documentation on the validity of the REALM-SF and the Hill-Bone HBP Compliance Scale was discussed in previous chapters within this EBP project report.

In total, 67 persons agreed to participate in the EBP project. Two (2) persons were excluded from the final analysis. The first exclusion failed to take the REALM-SF health literacy screening test after agreeing to participate. The project’s ethical framework permitted
participants to drop out at any time; therefore, the participant’s decision to withdraw prior to any collection of data was recorded as lost to attrition, and the participant was not included in the data analysis. The second participant excluded was unable to be reached for the follow-up Hill-Bone HBP Compliance Scale, and therefore the participant was lost to attrition. This was most unfortunate since the participant was a low literacy participant. However, attempts to contact the participant were conducted on four separate occasions, with unsuccessful results.

The participants (N=65) who completed the EBP project were included in the data analysis of this project. The REALM-SF health literacy screening tool was given to all 65 participants; a score of less than seven (7) indicated that some degree of low health literacy was present. In this EBP project, 9.3% of the participants were low literacy, slightly less than the 14% of American adults that are reported to have below basic health literacy (HHS, 2019). This could be the result of the small sample size and the attrition of a low literacy participant. Additionally, this project’s participation was voluntary, and persons who may have had literacy deficits may have declined to participate.

However, there are several findings that are worth discussion from the data analysis. First, the REALM-SF scores indicated that the majority of the participants had adequate health literacy skills (See Appendix J). Of those participants whose scores were less than seven, all were age 55 or older (See Appendix F). Educational level did not appear to be a factor in the health literacy scores, nor was income level. Participants with low health literacy scores, except for one participant who declined to answer, and one participant who had less than a high school education, were educated at high school/GED or above (See Appendix H). One participant’s education was recorded as some college and one participant was reported to have a four-year college degree. There were no participants who scored a six (6) on the REALM-SF which might have indicated a subtle error or borderline score in health literacy (See Appendix J). This finding may suggest that those with low health literacy scores were strongly suggestive of having health literacy deficits. Two (2) participants scored three (3) on the REALM-SF screening which
indicates a fourth to sixth grade reading level. The individuals scoring three or less, may struggle reading prescription medication bottles. This finding further supports the importance of the implementation of health literacy screening so that providers are knowledgeable of patients who may need further education or alternative practices in order to avoid patient safety concerns with prescription medications.

A second finding in the REALM-SF low literacy population was that there was only one (1) female and five (5) males in our sample. This indicates that the low literacy population in our sample was predominately males over 55 years of age. Additionally, the REALM-SF low literacy population consisted of Hispanic and African American participants, with one participant refusing to answer the ethnicity demographic question (See Appendix I). Therefore, the sample REALM-SF low literacy population consisted of mainly older adult males of minority populations with income and education not influencing low health literacy. Although further research may be needed, providers may benefit from an awareness of the potential need for increased patient education in older adult minority patient populations.

The Hill-Bone HBP Compliance Scale was a self-reported compliance scale that was given to participants currently treated for hypertension whose REALM-SF scores indicated the presence of low health literacy. The Hill-Bone HBP Compliance Scale asked questions regarding hypertension medication adherence, diet compliance, and compliance with physician visits (See Appendix E). The Hill-Bone HBP Compliance Scale may have been influenced by participants answering questions to please the assistants who were conducting the questionnaire. Additionally, the participant’s self-reported adherence may have affected the project results.

One participant, when called after four (4) weeks for a follow up Hill-Bone HBP Compliance Scale, stated, "I don’t have high blood pressure!" When questioned further about his statement, the participant explained to the DNP student, that since he took medication for hypertension, he no longer had high blood pressure. He stated he took the medication every day and now he didn’t have high blood pressure. The participant’s health literacy score was five (5), which may
have impacted his understanding of hypertension and indicated possible further educational needs of the participant.

**Evaluation of Applicability of Theoretical and EBP Frameworks**

The two frameworks used to guide this project through its progression from the initial development through the implementation and final evaluation were Lewin’s Change theory and the Evidence-Based Advancing Research and Clinical Practice Through Close Collaboration (ARCC©) Model developed by Melnyk and Fineout-Overholt. The evaluation of the frameworks chosen for this EBP project is discussed in this section.

**Theoretical Framework**

**Lewin Change theory.** The Lewin change theory worked by utilizing a three-step process of unfreezing, moving, and then re-freezing to produce a lasting change to an organization (Lewin, 1947; Schein, 1999). The Lewin change theory was chosen because it was designed to focus on small groups, and the office practice was small with less than 10 employees. The Lewin change theory emphasized that the change must be something that all members think would be a benefit to the organization, and many of the employees in this practice, discussed the positive benefits of implementing health literacy screening. In the first stage, unfreezing, the employees needed to become aware of the change so that they could recognize that the needs of patients could be overlooked or unmet by not realizing the health literacy status of patients. Education and discussions about health literacy and the effects on patient outcomes were discussed over conferences during luncheons. Recognition of the anxiety associated with any change was discussed with the practice group and verbalization of any questions or concerns were addressed.

The unfreezing stage of Lewin’s change theory allowed enthusiasm to build regarding the project, as well as preparation to move to the next stage of change. As information was shared regarding the importance of health literacy screening and the negative effects of not
identifying patients who may have low health literacy; the practice became excited to proceed to the next stage of the change.

The moving stage of the change theory occurred during the implementation of the project. The stakeholders were able to see the benefits of the project and were excited to collect data. The main stakeholder was concerned that the project might take considerable time and cause delays in patient flow. However, the REALM-SF was a very quick and easy screening tool to administer. Patient flow was not interrupted during the implementation phase of the project and therefore all stakeholders were pleased with the project.

During the moving phase of the project, one employee’s participation in the project quickly dropped off. As a mentor, the DNP student quickly identified the regression, and discussed the feelings and project with the team member. Other team members who were participating in the change were quick to voice disapproval with the team member who exhibited the regression. Through a mentorship dialogue, understanding and education was given to the team member and the project quickly resumed full implementation.

The implementation of the third stage of Lewin’s Change theory is described as refreezing. The change that was adopted, is set in place and has become a routine for the organization. Mentorship reinforced the importance of obtaining the health literacy of patients to improve patient health outcomes. The project was suspended the second week of December 2018, due to the holidays and sufficient sample size. During this time, the DNP student spoke with the organization and came by to reinforce the project change. However, the change process suffered a setback with the pregnancy leave of a major stakeholder. A new employee was hired to replace her, and this employee had not been through the change process or the implementation of the project. The organizational change began to erode and despite the return of the DNP student, the evaluation of the change process was that refreezing did not occur and the change did not become permanent. Additionally, although support was given to the adoption of health literacy screening, the inability to record the REALM-SF scores in the electronic health
record (EHR) presented as a major reason for the lack of adoption of the practice change. Working with the office, we attempted to find a suitable area within the EHR to record the REALM-SF results. However, we were unable to locate an area that would be able to flag the scores for future visits and record that health literacy screening had been performed. The failure of the EHR to provide a designated area for health literacy screening was possibly the biggest reason for the failure to adopt the practice change.

The strengths of the theoretical framework were that it identified the various stages of change and helped to move the group toward the goal of organizational change. The group moved through the change process with the help of the DNP student mentor. The one participant who regressed in the change process, was addressed in the change theory with interventions on how to persuade the individual to adopt the change process. The change process through the evaluation stage moved along as was described in the Lewin change theory process.

The weakness of the theoretical framework is that it does not give any concrete time limits to how long the stages of the change process need for full adoption. Another weakness of the change theory is that the introduction of new employees or the attrition of key stakeholders and change champions were not addressed in the theory. Further discussions on how to intervene when events challenge the change process would have been helpful. In conclusion, the overall evaluation of the change process was positive during the project. Full implementation of the project was positive by staff, stakeholders, and patients. However, during the re-freezing, the change agents were lost, and the change did not become permanent.

**EBP Framework**

The Evidence-Based Advancing Research and Clinical Practice Through Close Collaboration (ARCC©). The ARCC© EBP model was chosen for the framework of this EBP project because the DNP student identified a strong need for a mentor in the organization. The strengths of the ARCC© model was that the model allowed for an assessment of the readiness...
of the practice to adopt evidence-based practice (EBP) changes. This assessment helped to identify whether the practice was open to change and the ideas of EBP. It was determined that there were several change champions who identified deficits in the practice pertaining to patient education. It was identified that some patients required additional phone time to explain medications, testing, health conditions, and other medical issues. The use of the mentors and change champions was also considered a major strength of the ARCC© model. An EBP mentor is able to educate the group, provide support for the project, and help to decrease any barriers to the adoption of EBP. The project utilized the DNP student as the mentor, and also identified two change champions who helped to prepare and implement the practice change.

The ARCC© model was developed by Melnyk and Fineout-Overholt to advance the adoption of evidence-based practice in organizations toward EBP. The ARCC© model identified several necessary steps to working with a small group of individuals. Specifically, the ARCC© model utilized mentors as the primary leader in the adoption of an evidence-based practice change. The ARCC© was a good fit for the practice change because the group was anxious to adopt and implement an organizational change. The ARCC© model’s stages identified the barriers and strengths of the proposed EBP project prior to implementation to address any problems prior to implementation. Finally, several of the employees were seen as change agents who would work closely with the mentor to promote the practice change.

The purpose of the ARCC© model is to improve patient outcomes through the adoption of EBP (Melnyk & Fineout-Overholt, 2010). Through the identification of health literacy screening scores, education and information could help improve patient understanding and therefore improve patient outcomes. The focus on improving the outcome of care and the use of a mentor-based model were the ARCC© model strengths that were most important to this EBP project.
Strengths and Limitations of the EBP Project

Strengths

One of the strengths of this EBP practice project was that the practice was enthusiastic about adopting a health literacy screening program. Several staff members identified that there were patients who had additional educational needs and that they spent a lot of time on the phone answering phone calls. The staff stated that the practice might benefit from a health literacy screening practice change. The ability of the practice to identify the EBP project as a useful and valuable tool to increase patient outcomes was seen as strength prior to implementation.

A second strength of this EBP project was choosing the REALM-SF screening tool. The REALM-SF was a strength of the EBP project because it allowed an easy and quick screening tool to be administered to participants. The laminated screening sheet, required to administer the REALM-SF, was readily available and easy to administer. The ease of the REALM-SF administration allowed the staff to feel less time constraints when participants agreed to participate in the EBP project.

Lastly, the greatest strength of this EBP project was having the ability to raise awareness of hypertension medication adherence. Participants were educated about antihypertensive medication adherence as a result of agreeing to participate in this EBP project. Also, the physician and staff were educated on the new ACC/AHA guidelines, and potential impact of low health literacy on medication adherence. Lastly, other members of the nursing community who visited my poster or read my project report gained knowledge about the need for health literacy screening and the need to improve the adherence of antihypertensive medication adherence.

Limitations

Aside from minor setbacks in our implementation, the use of the ARCC© model worked well in the healthcare setting of a small private practice. Using the mentor and change...
champions was a positive factor that moved the adoption of the practice change. However, the attrition of the mentor due to a scheduled school break in which no clinical time could be done, and the loss of a prominent change champion due to pregnancy leave were definitely viewed as limitations to the ARCC© model’s structure for EBP adoption. The disruption was not identified or anticipated during the identification of potential barriers part of the EBP process. Perhaps this was because the preparation was completed in May/June and the adoption stage was not until December. Over the next six months, it was anticipated that the adoption of the EBP system change was working well with no difficulties to continued adoption of the EBP.

The second weakness of the ARCC© model is that the use of an EHR system became the primary reason that the system change did not achieve full adoption. Perhaps if the DNP student was an experienced user in the EHR system, it may have been possible to create or modify the EHR to house the health literacy scoring.

Implications for the Future

Practice. There are many reasons to recommend the future use and implementation of a health literacy screening program in the clinical practice setting. The use of health literacy screening helps to identify patients who may require additional education and who are at-risk for antihypertensive medication non-adherence due to low health literacy. Low health literacy may contribute to medication errors or misuse of medication due to being unable to read medication labels. Continuing to screen patients for health literacy could help to improve patient outcomes, especially in hypertension, where the medication adherence rates are approximately 30 to 50% (Hedna et al., 2015). Utilizing education programs that are written in easy to read language can help patients understand the importance of medication adherence and the severity of their condition. Health literacy screening can also help to identify low health literacy patients who may benefit from person-centered education such as photos, verbal instructions, and demonstrations.
This project helped to identify low literacy participants who were screened using the REALM-SF health literacy screening tool. Through the use of this screening tool the project identified low literacy participants who also had hypertension. Evidence has shown that antihypertensive medication adherence rates contribute to hypertension treatment failure and the risk of serious side effects (Roldan et al., 2018).

**Theory.** The Lewin change theory was utilized to guide the change process and the implementation of this practice change. Each of the three-stages in the process was applied to the organization. The Lewin change theory has been used since the 1940’s to implement changes in organizations and individuals within the organization (Schein, 1996). The theory was not designed for use specifically for healthcare; however, Lewin’s change theory applied to the organization’s need for change.

**Research.** This EBP project utilized evidence obtained through an extensive literature review to provide evidence for the project. Promoting health literacy through the implementation of a health literacy screening tool was a tested and valid screening process to obtain accurate health literacy scores for individuals. Additionally, the project sought to increase antihypertensive medication adherence rates in those participants with low literacy through a self-reported Hill-Bone HBP Compliance Scale. Although the Hill-Bone HBP Compliance Scale scores improved slightly from pre-test to post-test scoring, the results were not statistically significant (See Appendix G). The results of the pre and post Hill-Bone HBP Compliance Scale scores were tested using SPSS Paired Samples T-Test and non-parametric statistical analysis using Related-Samples Wilcoxon Signed Rank Test. This could be due to the small sample size (N = 6). Future nursing research might look at the adherence rates of all participants including those with adequate health literacy scores to evaluate the adherence rates. Additionally, the self-reported Hill-Bone HBP Compliance Scale results may be biased with participant responses which are not accurate.
Nursing researchers may also wish to explore the possibility that potential participants declined to participate due to low health literacy. The representation of low health literacy participants may have been impacted from lack of participation.

**Education.** This EBP project directly impacts all patient education and the need for health literacy screening prior to any patient education. The cornerstone of APN practice is the use of health promotion and education in patient care. Without the knowledge of a patient’s health literacy, education can be ineffective. This EBP project demonstrated that neither educational attainment nor income was a factor in the indemnification of the health literacy of participants, which is consistent with the literature (Clouston, Manganello, & Richards (2016). This EBP project also demonstrated that lower health literacy scores were seen in older adult males. The effects of gender and age, on health literacy scores, that were seen in this EBP project are consistent with the literature (Clouston, Manganello, & Richards (2016). Therefore, to be effective in providing patient educational needs, health professionals need to be aware that health literacy deficits may exist and that health professionals can help improve patient outcomes by implementing health literacy screening practices prior to educational interventions.

This EBP project did not find that changes pre and post Hill-Bone HBP Compliance Scale scores, after educational interventions, were statistically significant in the improvement of medication adherence of antihypertensive medications of low literacy participants. However, the scores were improved between pre and post testing. This difference in variance may indicate a sampling error or small sample size. Further nursing research focused on delivering low literacy interventions aimed at increasing antihypertensive medication adherence with a larger sample size may be indicated.

**Conclusion**

The implementation of a health literacy screening tool to provide a system change in an Internal Medicine practice was implemented over an 8-week period. A total of 65 participants over the age of 21 agreed to participate. The participants were asked to read seven (7) words,
pertaining to health that comprised the REALM-SF health literacy screening tool. Those who scored less than seven (7) and who had hypertension, were then given the Hill-Bone HBP Compliance Scale to measure anti-hypertensive medication adherence. Educational interventions focused on improving medication adherence in hypertension were then delivered to the participant in the form of verbal and easy-to-read materials. A second Hill-Bone HBP Compliance Scale was performed four weeks after the intervention. Lewin’s change theory guided this EBP system change and the ARCC© model was a framework for the EBP implementation. There were six (6) participants whose scoring identified them as having low health literacy. The intervention, although not statistically significant, did improve the scores between the pre and post test. This EBP project identified that low health literacy was identified in the patient population, and identification of low literacy may be beneficial prior to educational interventions. Replicating this project with more participants may be indicated for future evaluation regarding antihypertensive medication adherence.
REFERENCES


BIOGRAPHICAL MATERIAL

Boyann Bonjean

Boyann attended Indiana University Northwest and obtained her Associate Degree in Nursing in 1982. She began her career in nursing working in critical care units, ICU/CCU and Medical ICU. She then moved to the surgery department, where she worked both pre-operative and the post anesthesia care unit (PACU). Boyann spent over 17 years working in an orthopedic clinic as a manager and orthopedic nurse. She obtained her Bachelor of Science degree in Nursing from Arizona State University graduating Magna Cum Laude. In 2015, Boyann began working on her Doctorate in Nursing Practice degree. She hopes to continue her nursing practice with work in primary care to help patients in Northwest Indiana to increase understanding and medication adherence in hypertension. The goal of her EBP project was to implement a health literacy screening program with an emphasis on educating patients with low literacy and hypertension to increase medication adherence. As an advanced practice registered nurse Boyann hopes to continue her interest in hypertension and health literacy. She recently presented her EBP project poster at the NWIRC conference. She is a member of the American Nurses Association, The American Association of Nurse Practitioners, The Indiana State Nurses Association, Sigma Theta Tau International Honor Society of Nursing Zeta Epsilon chapter, Coalition of Advance Practice Nurses of Indiana (CAPNI), and the Golden Key International Honor Society.
ACRONYM LIST

AAA: Abdominal aortic aneurysm
ACC/AHA: American College of Cardiology/American Heart Association
ACP: American College of Physicians
AHRQ: The Agency for Healthcare Research and Quality
APRN: Advance Practice Registered Nurse
ARCC: Advancing Research and Clinical Practice Through Close Collaboration
B HLS: Brief Health Literacy Screening
CBT: Cognitive Behavioral Theory
CDC: Centers for Disease Control
CHF: Congestive Heart Failure
CKD: Chronic Kidney Disease
CVA: Cerebrovascular Accident
CVD: Cardiovascular Disease
EBP: Evidence-Based Practice
ISDH: Indiana State Department of Health
JBI: Joanna Briggs Institute
MMAS-8: Morisky Medication Adherence Scale
MI: Myocardial infarction
NHLBI: National Heart, Lung, and Blood Institute
NIH: National Institutes of Health
OD: Organizational Development
PAD: Peripheral Vascular Disease
RCT: Randomized Controlled Trial
REALM: Rapid Assessment of Adult Literacy in Medicine
STOFHLA: Short-test of Functional Health Literacy in Adults

WHO: World Health Organization
### Table 1

**Evidence Table**

<table>
<thead>
<tr>
<th>Citation (APA)</th>
<th>Purpose</th>
<th>Design</th>
<th>Sample</th>
<th>Measurement/Outcomes</th>
<th>Results/Findings</th>
<th>Level/Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghembaza, M. A., Senoussaoui, Y., Kendouci Tani, M., &amp; Megueni, K. (2014). Impact of patient knowledge of hypertension complications on adherence to antihypertensive therapy. <em>Current Hypertension Reviews</em>, 2014(10), 41–48. Interlibrary loan request.</td>
<td>To assess if there is a positive association between patient knowledge regarding the complications of hypertension and the adherence to antihypertensive medications.</td>
<td>Cross-sectional study design.</td>
<td>N= 453 study participants who lived in Tunisia, and who had resided in Tlemcen for a minimum of 3 months</td>
<td>Girerd Adherence Scale: self-reported measure antihypertensive adherence. 42 patients selected for interview. Outcome: 98% response rate to survey. 35.5% adherence rate to antihypertensive medications.</td>
<td>Knowledge about the complications of hypertension was associated with increased adherence. Increasing knowledge of patients regarding hypertension treatment and complications with increased counseling is recommended. Comorbidities and increased medications, decreased adherence to antihypertensive medications.</td>
<td>Level III Quality B</td>
</tr>
<tr>
<td>Gwadry-Sridhar, F. H., Manias, E., Lal, L., Salas, M., Hughes, D. A., Ratzki-Leewing, A., …, Grubisic, M. (2013). Impact of interventions on medication adherence and blood pressure control in patients with essential hypertension: A systematic review by the ISPOR Medication and Adherence and Persistence Special Interest Group. <em>Value in Health</em> 16(2013), 863–871. Retrieved from <a href="http://dx.doi.org/10.1016/j.jval.2013.03.1631">http://dx.doi.org/10.1016/j.jval.2013.03.1631</a></td>
<td>The purpose of this review was to evaluate interventions used to increase adherence to antihypertensive medications.</td>
<td>This was a systematic review however no meta-analysis was performed.</td>
<td>97 articles were included in this systematic review. The majority 58/97 or 59.8% of the studies were from random control studies.</td>
<td>Search strategies focused on interventions that increased adherence to antihypertensive medications. Outcome: 138 studies were found with 41 excluded. Outcome: Various interventions were analyzed for statistical significance.</td>
<td>After reviewing the studies, interventions that focused on education and increasing a patient’s knowledge of medications was effective in increasing adherence.</td>
<td>Level II evidence Quality A</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Title</td>
<td>Journal</td>
<td>Year</td>
<td>Study Design</td>
<td>Sample Size</td>
<td>Measures</td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
<td>---------</td>
<td>------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Halladay, J. R., Donahue, K. E., Cené, C. W., Li, Q., Cummings, D. M., Hinderliter, A. L., . . . DeWalt, D. (2017).</td>
<td>The association of health literacy and blood pressure reduction in a cohort of patients with hypertension: The heart healthy lenoir trial.</td>
<td>Patient Education and Counseling, 100(2017), 542–549. Retrieved from <a href="http://dx.doi.org/10.1016/j.pec.2016.10.015">http://dx.doi.org/10.1016/j.pec.2016.10.015</a></td>
<td>2017</td>
<td>Non-randomized cohort trial</td>
<td>N= 525 participants with uncontrolled hypertension. 493 completed the assessment.</td>
<td>Short-test of Functional Health Literacy in Adults (STOFHLA) Implemented QI measures on both the practice level and patient level.</td>
</tr>
<tr>
<td>Ingram, R. R., &amp; Ivanov, L. L. (2013).</td>
<td>Examining the association of health literacy and health behaviors in African American Older Adults.</td>
<td>Journal of Gerontological Nursing, 39(3), 22–32.</td>
<td>2013</td>
<td>Descriptive correlational study design</td>
<td>A convenience sample N= 121 African American adults over the age of 50 with hypertension who were on medication or lifestyle modifications.</td>
<td>REALM health literacy tool to measure health literacy of participants. Hill-Bone Compliance Scale (HBCS) to measure medication adherence</td>
</tr>
<tr>
<td>Jankowska-Polanska, B., Uchmanowicz, I., Dudek, K., &amp; Mazur, G. (2016).</td>
<td>Relationship</td>
<td></td>
<td></td>
<td>Descriptive cross-sectional survey design.</td>
<td>N=233 subjects 124 females between 32-90 years old,</td>
<td>Hypertensive Knowledge Level Scale (HK-LS), Morisky Medication</td>
</tr>
</tbody>
</table>
### Health Literacy/Adherence


To research and find the preventing issues and positive changes to improve adherence to blood pressure medication. Review of current literature. 7 articles were included in the reviewed. The review looked at reasons for non-adherence and interventions that increased adherence. Addressing medication adherence is important for providers to address with patients during visits. Interventions to increase knowledge and adherence should be patient-centered and attempt to decrease barriers to adherence. Level V Quality A

To examine the association of low literacy and its effects on uncontrolled hypertension and non-adherence to antihypertensive medications. Cross-sectional analysis of a randomized controlled trial. N= 423 participants from Atlanta, Georgia urban primary care clinics. Subjects were interviewed and testing for cognitive function, literacy, and medication adherence were conducted. The results for the sample n=423 showed n=192 had low health literacy and n=231 had marginal or adequate health literacy. Lower literacy was associated with uncontrolled hypertension. 41% for low literacy compared with 51% for marginal or adequate literacy participants. Low literacy was not associated with medication adherence however, these were self-reported. Level III Quality A


<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>To review various interventions for improving antihypertensive medication adherence using EBP standards in care.</td>
</tr>
<tr>
<td>U. S. Government work review of current literature.</td>
</tr>
<tr>
<td>The review cited 44 studies.</td>
</tr>
<tr>
<td>The review focused on studies to evaluate the interventions used to increase medication adherence and how adding evidence-based interventions can improve patient outcomes in medication adherence.</td>
</tr>
<tr>
<td>Findings of the review indicate that multiple factors impact adherence. These include: patient knowledge, support systems, socioeconomic status including health literacy, education, income, medication tolerance, provider communication relationship with provider, access to medication and the need for the development of educational strategies, multidisciplinary &amp; culturally sensitive care.</td>
</tr>
<tr>
<td>Level V Quality B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>To find evidence that supports the association of low health literacy and control of hypertension.</td>
</tr>
<tr>
<td>Evidence Summary</td>
</tr>
<tr>
<td>4 studies were used as evidence for this evidence summary.</td>
</tr>
<tr>
<td>The evidence summary measured various studies that included (2) cohort, observational and cross-sectional studies. The outcome was a recommendation to take steps to improve the health literacy of patients with hypertension.</td>
</tr>
<tr>
<td>Health literacy is associated with lack of knowledge in health conditions. Low health literacy may contribute to poor hypertension management and medication adherence.</td>
</tr>
<tr>
<td>Level I Quality B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>To examine whether health literacy as well as cognitive, social and cultural demographical factors have an effect on medication adherence in hypertension.</td>
</tr>
<tr>
<td>Cross-sectional survey design.</td>
</tr>
<tr>
<td>sample size was N=600. The response rate was 100%. The age was over age 60. There were 145 males and 455 females.</td>
</tr>
<tr>
<td>An interview questionnaire using a 4-point Likert scale that measured health literacy. Included in the questionnaire were: Demographics Literacy Cognitive ability Culture and Society Health literacy Health literacy had a significant effect on blood pressure (ß= -0.14, p&lt;0.05) Medication adherence</td>
</tr>
<tr>
<td>The findings suggest a link to health literacy and the adherence of antihypertensive medications. Furthermore, there may be a link to blood pressure levels and health literacy of the disease of hypertension. Patients who had lower knowledge levels were not adherent to antihypertensive medication treatments.</td>
</tr>
<tr>
<td>Level III Quality B</td>
</tr>
</tbody>
</table>
Consent Form
Evidence-Based Project

Health Literacy and High Blood Pressure Medication Adherence

**Project Leader**: Boyann Bonjean, BSN, RN Doctoral candidate at Valparaiso University.

**Purpose of project**: I am being asked to participate in an evidence-based project that screens patients for health literacy and gives additional information to patients who have high blood pressure to attempt to increase the adherence rate of blood pressure medications.

**Specific Procedures Used**: If I agree to participate in this project, I will be asked to read seven (7) words that are related to health. If I have high blood pressure, depending on my health literacy screening, I may be asked several questions during your visit about taking high blood pressure medications.

The physician or nurse may provide me with more educational information about high blood pressure and the importance of taking blood pressure medications. I may also receive a phone call to ask me the same questions about taking high blood pressure medications.

**Length of time**: I understand that I may be asked questions today and receive one follow-up phone call not more than 30 days after today.

**Risks**: There are no risks that have been identified to participating in the evidence-based practice project.

**Benefits**: By participating in this evidence-based project, I understand that screening for health literacy will assist your health care provider in determining if I need additional information and education for my health conditions. If I have high blood pressure, I may be given additional information and asked additional questions about taking high blood pressure medicines.

**Voluntary Participation/Withdrawal**: My participation in this project is voluntary. At any time during the participation in this project, I may decide to stop participating. There is no effect of participation on the health care services that I will receive.

**Confidentiality**: All information in this project will be kept confidential. The results are coded to protect the identification of the participants. All information will be kept in a locked cabinet. No personal identifying information will be used. I understand that my name will not be used if the results of this project are published. I understand my name will not be written on papers used to track data or information.

Initials _______
Consent to Participate in the Project: I acknowledge that I am 18 years or older, and that I am a patient at this medical clinic. The participation is up to me and I am free to withdraw at any time without any questions.

Human Subjects Statement

I have asked ______________________ about this project and he/she has answered my questions. I can call Boyann Bonjean at (219) 682-6872 to answer any other questions that I may have. I also understand that I can contact the Institutional Review Board at Valparaiso University through the Associate Provost’s Office, Kretzmann Hall, Valparaiso, Indiana 46383. The chairperson of the Institutional Review Board is Jennifer Winquist Ph.D.

I understand that my being in this project is up to me and I am free to withdraw at any time without any effect on my care.

__________________________  ________________
Date                                                                       Patient Name (Please Print)

__________________________  _______________________
Patient Signature

__________________________  _______________________
Date                                                                       Witness Signature
Appendix C

Demographic Form

EBP Project / Health literacy and High Blood Pressure

ID# ________________

Demographic Information Form

Thank you for agreeing to participate in this project. Please answer the following questions that will be used as data for the project statistics. Please circle or write your response that best applies to the following questions. No names will be used with this information.

1. Gender identification
   a. female
   b. male
   c. identifies as: ________________

2. Date of birth ___/____/_______

3. Education
   a. less than high school
   b. high school or GED
   c. some college
   d. 4-year college degree
   e. graduate degree

4. Ethnicity/Race
   a. Non-Hispanic White
   b. Black (African American)
   c. Hispanic
   d. Asian
   e. Native American
   f. Other ________________

5. Health Insurance (Circle all that apply)
   a. Medicare
   b. Medicaid
   c. Employer provided Health Insurance (ex. Anthem, Cigna, United Health Care)
   d. No insurance
   e. HIP or Obama Care, Self-Insurance

6. Income level
   a. under 20,000 dollars per year
   b. 20,001- 50,000 dollars per year
   c. 50,001- 99,999 dollars per year
   d. over 100,000
7. County of residence
   a. Lake
   b. Porter
   c. Jasper
   d. LaPorte
   e. Other ________________
Appendix D

*REALM-SF Score Sheet*

<table>
<thead>
<tr>
<th>Patient ID #: ________________________</th>
<th>Date: __________</th>
<th>Examiner Initials: ____</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior</td>
<td>______</td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td>______</td>
<td></td>
</tr>
<tr>
<td>Menopause</td>
<td>______</td>
<td></td>
</tr>
<tr>
<td>Rectal</td>
<td>______</td>
<td></td>
</tr>
<tr>
<td>Antibiotics</td>
<td>______</td>
<td></td>
</tr>
<tr>
<td>Anemia</td>
<td>______</td>
<td></td>
</tr>
<tr>
<td>Jaundice</td>
<td>______</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td>______</td>
<td></td>
</tr>
</tbody>
</table>
### Hill-Bone HBP Compliance Scale

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Response:</th>
</tr>
</thead>
</table>
| 1   | How often do you forget to take your HBP medicine?                   | 1. All of the Time  
                                         | 2. Most of the Time  
                                         | 3. Some of the Time  
                                         | 4. None of the Time |
| 2   | How often do you decide NOT to take your HBP medicine?               | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 3   | How often do you eat salty food?                                     | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 4   | How often do you shake salt on your food before you eat it?          | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 5   | How often do you eat fast food?                                      | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 6   | How often do you make the next appointment before you leave the doctor’s office?* | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 7   | How often do you miss scheduled appointments?                        | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 8   | How often do you forget to get prescriptions filled?                 | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 9   | How often do you run out of HBP pills?                               | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 10  | How often do you skip your HBP medicine before you go to the doctor? | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 11  | How often do you miss taking your HBP pills when you feel better?    | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 12  | How often do you miss taking your HBP pills when you feel sick?      | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 13  | How often do you take someone else’s HBP pills?                      | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |
| 14  | How often do you miss taking your HBP pills when you are careless?   | 1.       
                                         | 2.       
                                         | 3.       
                                         | 4.       |

* Reverse coding

Note:
Scale and subscale scores are calculated by summing individual items.
Reducing sodium intake subscale: Items 3,4,5
Appointment keeping subscale: Items 6,7
Medication taking subscale: Items 1,2, 8,9,10,11,12,13,14
Appendix F Participant Age Range

Total Participant Age Range

REALM-SF Less than Score of Seven Age Range
Appendix G

Pre Hill-Bone HBP Compliance Scale Scores/ Post Hill-Bone HBP Compliance Scale Scores

Paired Samples Statistics

<table>
<thead>
<tr>
<th>Pair</th>
<th>PreTotal</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PreTotal</td>
<td>50.5000</td>
<td>6</td>
<td>5.08920</td>
<td>2.07766</td>
</tr>
<tr>
<td></td>
<td>PostTotal</td>
<td>52.8333</td>
<td>6</td>
<td>1.94079</td>
<td>.79232</td>
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</tbody>
</table>

**T-Test**

Paired Samples Test  Statistical Analysis of PreHill-Bone HBP Compliance Scale Scores compared to Post Hill-Bone HBP Compliance Scale Scores

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 1</td>
<td>PreTotal - PostTotal</td>
<td>-2.3333</td>
<td>3.38625</td>
<td>1.38243</td>
<td>-5.88698</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.22031</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.688  5  p = .152
Appendix H Participant Education Levels

Simple Bar Count of education

Count

0.00  less than high school  high school or GED  some college  4-year college degree  graduate degree

education

Low literacy education

Count

0.00  less than high school  high school or GED  some college  4-year college degree  graduate degree

education

Filtered by REALM > 1 (FILTER) variable
Appendix I Ethnicity of Participants

### Low literacy ethnicity

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>non-hispanic white</td>
<td>1</td>
</tr>
<tr>
<td>black (African American)</td>
<td>4</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1</td>
</tr>
<tr>
<td>Asian</td>
<td>0</td>
</tr>
<tr>
<td>Native American</td>
<td>0</td>
</tr>
<tr>
<td>other</td>
<td>0</td>
</tr>
</tbody>
</table>

### Ethnicity

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>non-hispanic white</td>
<td>40</td>
</tr>
<tr>
<td>black (African American)</td>
<td>11</td>
</tr>
<tr>
<td>Hispanic</td>
<td>6</td>
</tr>
<tr>
<td>Asian</td>
<td>0</td>
</tr>
<tr>
<td>Native American</td>
<td>0</td>
</tr>
<tr>
<td>other</td>
<td>0</td>
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</tbody>
</table>
Appendix J REALM-SF Scores

<table>
<thead>
<tr>
<th>REALM</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
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</thead>
<tbody>
<tr>
<td>Valid scored  7</td>
<td>58</td>
<td>90.6</td>
<td>90.6</td>
<td>90.6</td>
</tr>
<tr>
<td>scored 5</td>
<td>2</td>
<td>3.1</td>
<td>3.1</td>
<td>93.8</td>
</tr>
<tr>
<td>scored 4</td>
<td>2</td>
<td>3.1</td>
<td>3.1</td>
<td>96.9</td>
</tr>
<tr>
<td>scored 3 or less</td>
<td>2</td>
<td>3.1</td>
<td>3.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
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