A Screening Assessment of Health Literacy Levels to Develop Hypertension Handouts based on the patient’s Levels of Health Literacy at the McAuley Health Center

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Guideline Directed Educational Handouts Effect on Hypertension outcomes

**INTRODUCTION**

Hypertension is the most common clinical condition treated in primary care settings. In 2017, the American College of Cardiology and the American Heart Association published new guidelines for hypertension management and defined high blood pressure as a blood pressure at or above 130/80 mm Hg. Stage 2 HTN is defined as a blood pressure at or above 140/90 mm Hg. Nearly half of adults in the United States (108 million, or 45%) have hypertension (Rubenfire, 2018 & Center for Disease Control, 2020).

**Conceptual Model for Hypertension Health Literacy**

Health literacy has been identified as a complex and multidimensional concept. Health literacy is not only about the patient’s literacy level, which includes writing and reading, but also relates to broader concept of patient’s skills and abilities to interact/understand, comprehend and use of educational, social and cultural influences to promote good health. Patient Health literacy abilities are not about patient’s knowledge, but also other necessary factors such as when and where to seek health information; patient verbal communication, assertiveness, application skills, and retaining and processing information. Other factors such as healthcare system, socioeconomic factors, social support, education, cultural influences and patient attitudes and experiences are identified to have a role in patient’s ability to seek, understand, and utilize health information (Jordan, Buchbinder, & Osborne, 2011).

This illustration shows the complexity of patient-centered care to health literacy, educational handouts and health outcomes:

Htn

Health Literacy Patient Health education/Handouts

Outcomes

**Health Education/Handouts**

Patient education is considered an essential element of communication between healthcare providers and the patient. Patient education consists of verbal and written materials, including educational materials such as educational leaflets and, in recent years, electronic versions such as websites (Hoving, Visser, Dolan Mullen, & Van den Borne, 2010).

Patient education is defined by Van den Borne as “A systemic learning experience in which a combination of methods is generally used, such as the provision of information and advice and behaviour modification techniques, which influence the way the patient experiences his illness and /or his knowledge and health behavior, aimed at improving or maintaining health or learning to cope with a condition, usually a chronic one.”(Van den Borne, p 90, 1998).

Green and Kreuter (1991) defined health promotion as “Any planned combination of educational, political, regulatory, and organizational support for actions and conditions of living conducive to the health of individuals, group or communities” (Van den Borne, p 90, 1998).

The interest in patient education and its foundation in scientific research is new. The *Journal of Patient Education and Counseling* was established in 1976 to address the issues of health literacy. The patient’s education development was started in the 1980s when a social demand to patient’s rights and the growth for patient’s advocacy was initiated. Prior to that time, patients were viewed as passive and were not supposed to participate in diagnosis or treatment of plan of care (Hoving et al., 2010).

Patient education should be integrated in patient’s health promotion since the Lalonde report (1974) established that patients are able to improve their health through lifestyle changes such as healthy diet and exercise. Self-efficacy is a concept that was introduced by psychological and behavioral research overtime and transformed health promotion definition from just transferring knowledge to someone to more complicated health behaviors (Hoving et al., 2010).

There have been many studies and surveys indicating that illiteracy is rare in the United States. However, these studies confirmed that many adults in the U.S are not able to understand complex printed material found in their daily lives (Rudd, 2007). Many educational handouts that discuss high blood pressure management are written at high literacy level, may limit patient’s understanding of their plan of care and can contribute to poor health outcomes. It is estimated that low literacy level has added cost of 73 billion dollars to US healthcare system (Badarudeen & Sabharwal, 2010).

It is estimated that one half of adults have difficulty understanding printed handouts and may not be understood and thus, not be used by patients. Further, health literacy level positively is related to higher hospital admission, emergency room visits, lower understanding and use of preventive services, poor adherence to medications and higher mortality rate (Safeer & Keenan, 2005).

Educational leaflets are an effective method in teaching patients, however most of the leaflets are not customized to patient’s needs, reducing their effectiveness. In developing educational leaflets, the target population’s need should be considered. For example, an adult educational leaflet is different from an educational leaflet for children. Patients prefer simple written instructions regardless of their literacy level and previous studies have shown that the mean reading level of patients was at an 11-year old reading skill. Based on recent findings, it is recommended that any educational leaflet be written at the lowest reading level (Lampert, Wien, & Haefeli, 2016).

There have been many studies that have shown that most health materials are written at an average high school graduate reading level. Educational leaflets cover education materials for patients in 5 areas: health promotion, health protection, disease prevention, healthcare management, and system navigation(Rudd, 2007). Several studies showing improved health outcomes when health education is implemented. The role of healthcare providers has been identified as crucial in educating patients and improving their outcomes. Healthcare providers can improve patients’ engagement by improving their health literacy (Patrick, Patel, Tajik, & Chandrasekaran, 2017).

There is an assumption that patients with low health literacy have a low understanding of the verbal communication that is delivered to them by their healthcare providers. It is also known that low health literacy can result in poor self-health management and health care utilization. Health preventive measures are effective when the health literacy of patients is evaluated and understood by their healthcare providers. Healthcare providers and patients are both responsible and should work together to achieve the optimal goal of care. Healthcare providers have the responsibility to inform patients on how to achieve health and wellness, and patients have a responsibility to act upon the information that they receive from their healthcare providers.

Health outcomes improvement is essential in rising healthcare costs and has a direct relation with self-management and patient education (Patrick et al., 2017).

Readability is another factor that has a vital role in understanding provided educational leaflet. Readability is the matter of sentence structure and length of the sentence, number of syllabus used in words, and vocabulary used in the sentence. Readability doesn’t equate to health literacy (Protheroe, Estacio, & Saidy-Khan, 2015).

Patient education is a learning process designed in enabling patients to optimize their health and well-being. The goal of patient education is to improve self-efficacy and self -management with subsequent improvement in health outcomes. Recent studies have shown that tailored patient education can improve self-efficacy and health outcomes secondary to meeting patient’s individual needs (Ndosi et.al., 2015).

There is a possibility that patient’s knowledge correlates positively with self-management. Self-management empowers individuals to be involved in several areas of their care including: compliancy with medications, following lifestyle modifications, close monitoring of symptoms, and continuing with follow-ups. Several studies failed to demonstrate improvement in blood pressure after patients were mailed hypertension educational materials, however patients showed higher levels of knowledge about hypertension and its management. Patients also showed higher satisfaction with their physicians. Even the short-term outcomes failed to demonstrate better management of HTN but there is possibility that an increase in awareness about HTN can improve long term adherence to medications and change long-term outcomes (Hunt, Siemienczuk, & Touchette, 2004).

HTN, like many other chronic diseases, can be prevented in many cases by managing modifiable factors, including but not limited to diet and exercise. Patient education is essential in enabling patients to navigate their chronic disease management. However, time is the essence in developing patient educational material. Educational materials help the patients understand their disease and its management clearly (Patrick et al., 2017). Degli Esposti et al. (2004) reported a 40% drop in the rate of adherence to HTN treatment medications after 1 year of treatment initiation and the rate continues to fall with continuation of treatment (Warren-Findlow, Coffman, & Vinoski Thomas, 2019).

**Patient education in primary care**

Patients accept and trust the health-related advice from their healthcare providers. General Practitioners report that several obstacles, including time, prevent them from being engaged in patient’s education. This difficulty has been changed by nurse practitioners and their involvement in the process of patient education, as they are able to accept more responsibilities in both healthcare system and in educating patients. A nurse practitioner’s education is more focused on counseling and patient education when compared to a physician’s education (Hoving et al., 2010).

Nurse practitioners (NPs), are vital professional in the primary care workforce, that play a significant role in communicating with patients, sharing information and engaging the patient to participate in their health status. At present, NPs make up the most rapidly growing component of the primary care workforce and are predicted to be sentinel component of the primary care workforce in the next decade (Pohl, Thomas, Bigley, & Kopanos, 2018).

**Patient education in secondary and tertiary care**

Patient educationis identified as a factor in reducing anxiety and stress and increasing patient’s satisfaction in acute care settings such as hospitals. A patient’s education is mostly deferred to other settings, such as nursing homes or ambulatory care, due to increasing healthcare cost and a decrease in length of hospital stay. In-hospital treatments are focused on the short term stay and not long-term stay. As such, patients with chronic disease and long-term stay in a hospital bring different challenges to patient education in the hospital setting. Patient education is complex, and hospitals need to have health educators and health coordinators to develop patient education materials, also need to provide in -service training for staff in acute settings (Hoving et al., 2010).

**Factors influencing patient education development**

The American Medical Association suggests that research development in the areas of health literacy screening and improving communication with low-literacy patients would improve health literacy of the population (Sorensen et al., 2012). Technological advances, age, and cultural diversity are among the factors influencing patient education. As technological treatments become more complex, patients require more educational material and communication with their providers to better understand the purpose of the treatments and plan of care. Aging population is the next challenge in healthcare system. The population around the world is becoming older and living longer. This population has more chronic illnesses and more comorbidities. Self-management and patient education are more challenging in this age group. World population is also becoming more diverse. Patients have different cultures and beliefs and the patient’s education should be developed based on the culture and their beliefs so it can be effective and accepted by the patient (Hoving et al., 2010).

**Hypertension**

High blood pressure was a primary or contributing cause of death for more than 494,837 people in the US in 2018. Only about 1 in 4 adults (24%) with hypertension have their condition under control. High blood pressure costs the United States about $131 billion each year, average over 12 years from 2003 to 2014. In 2018, nearly half a million deaths in the United States included hypertension as a primary or contributing cause. High blood pressure is more prevalent in men (47%) than women (43%). High blood pressure is more common in non-Hispanic Black adults (54%) than in non-Hispanic White adults (46%), non-Hispanic Asian adults (39%), or Hispanic adults (36%). Among those recommended to take blood pressure medication, blood pressure control is higher among non-Hispanic White ( 32%) than in non-Hispanic Black adults( 25%), non-Hispanic Asian adults( 19%), or Hispanic adults( 25%).High blood pressure age-adjusted prevalence in the United States ranges from 24.3% to 38.6%, Michigan rates of hypertension ranges from 30.1 to 31.9% (Center for Disease Control, 2020).

African-Americans are among the population with high disparities in prevalence and management of HTN. African-American patients identify barriers in treating HTN as: 1) being in denial about their diagnosis, 2) lack of knowledge, 3) poor communications with the providers, 4) lack of compliancy with their medications, and 5) difficulty in managing other chronic disease in conjunction with HTN (Rimando, 2015).

Among undeserved population who have not had routine access to care, health literacy can be important component in caring for patients with HTN. Health literacy has been identified as a factor in reducing health disparities and providing patient centered care. The vulnerable population has been identified as individuals who belong to racial/ethnic minority groups who have limited English language skill and have limited literacy skills (Hasnain-Wynia & Wolf, 2010).

A qualitative study in finding barriers in treating HTN in African-Americans revealed that patients perceived the following as barriers to their treatment: 1) financial instability, 2) missing clinic appointments, 3) lack of motivation to exercise, and 4) fear of injury from exercise. Social issues influence HTN treatment that include health insurance status, cost of medications, family issues, and personal embarrassment. These should also be considered (Rimando, 2015).

HTN is more prevalent in low-income community populations. There is a direct correlation between the consumption of food with high concentration of fat and carbohydrates with hypertension. The low-income and homeless populations have less access to healthy food and obesity is prevalent in this population. Low-income women, especially African-Americans and Latinas, are more at risk of food insecurity, and more at risk of developing HTN, diabetes, and cancer. African-Americans are at higher risk of developing HTN. There is a higher risk of disability and death from cardiovascular diseases in minority, low-income, and homeless populations (Huckabay, Reynolds, Fisher, Odell, & Dyo, 2016).

**Non-physiological risk factors for HTN**

Stress is one of the risk factors that can cause adverse physiological changes in the cardiovascular system, with a high incidence of development of HTN. There is a direct correlation between negative emotions and HTN. Underprivileged and homeless populations have a high level of stress, as they are often not able to financially to take of themselves and their families. Nutrition also has direct effects on HTN. Healthy eating can be considered a protective factor against HTN. However, as mentioned above, the underprivileged and homeless population lack access to healthy food which can result in obesity in these populations (Huckabay et al., 2016)

**HTN Adverse Effects**

Hypertension (HTN) is the most common chronic health problem in the United States, affecting approximately one in every three adult persons. HTN, if untreated or mismanaged, can result in adverse outcomes such as stroke, myocardial infarction, heart failure, cardiac arrhythmia, renal disease, peripheral arterial disease, and abdominal aortic aneurysm. The American College of Cardiology (ACC) and the American Heart Association (AHA) estimated that adults 45 years of age among all ethnicity groups are at risk for hypertension. African Americans have the highest risk at 93%, followed by Hispanics/Latinos at 92% (Whelton et al., 2017).

The population of U.S. patients with hypertension is estimated to be about 140 million.

Controlled HTN is an important factor as it reduces risk for adverse events and improves health and longevity. For many patients, especially those in underserved areas, there are gaps in the understanding and management of high blood pressure. Patients at high risk for HTN include those who experience healthcare disparities and are of undeserved population, particularly African Americans and Hispanics/Latinos. Efforts of health care providers to engage patients and share information and strategies to optimize blood pressure control, such as a risk assessment for HTN, are pivotal in reducing adverse outcomes. HTN is managed with pharmacological and non-pharmacological strategies including prescribed medications, exercise, stress reduction techniques such as yoga and mindfulness, and low-salt, low-fat, plant-based diets. Patient education is essential in empowering patients to self-manage their chronic illness and is an important part of the healthcare provider’s recommendations (Huckabay et al., 2016).

**HTN Management**

Hypertension is one of the most important risk factors of cardiovascular and kidney disease. The factors influencing hypertension control are complex and include pharmacological and non-pharmacological treatments. The non-pharmacological treatments include lifestyle changes such as diet, exercise, weight loss, and smoking cessation. HTN is a chronic disease and patients often fail to achieve treatment goals regarding expensive medications that populations may not be able to afford. The traditional education approach to addressing high blood pressure includes prescribing medication to reduce blood pressure, along with lifestyle changes such as weight loss, reduced sodium intake, and regular exercise such as walking and yoga. Additional interventions include a balanced low salt diet with increased amounts of fruits and vegetables, along with low fat dairy products. The DASH diet is one of the most effective plans that reduces blood pressure in African Americans by 11% and should be recommended for use in treating hypertension. Adherence to a stable treatment regimen is recommended and usually requires at least two medications to achieve blood pressure control. Persons of color have higher resting blood pressures and often require more than two drug regimens. For those with poorly controlled blood pressure, more medications are needed and may require a diagnostic evaluation to determine the best medication plan and often a referral to nephrology if the blood pressure cannot be controlled. Individual patients should be engaged in their care and, with the provider, adapt the plan to fit the patient’s ability to manage their hypertension. Factors to evaluate with patients include fiscal income, literacy levels, health status, socioeconomic status, and a consistent relationship with the primary health care provider or other social workers who may be able to arrange a home blood pressure machine and provide counseling if relevant to the patient’s home situation (Ribeiro et al., 2011).

There are two classifications for extra body weight: obesity and overweight. A Body Mass Index (BMI) of 25-29 characterizes an individual as overweight, and a BMI of more than 30 falls under the obesity classification. Weight loss in people with a BMI of above 24 has significant effects on hypertension outcomes. One study has shown that weight loss of about 22 pounds can reduce systolic blood pressure by approximately 6 mmHg and another study has shown that approximately two pounds of weight loss correlates to a one mmHg drop in blood pressure. Another recommended strategy to lose weight is through exercise. Weight loss is not only effective in reducing blood pressure, but subsequently reduces cardiovascular mortality rate by 9% and stroke mortality by 14%. One study has shown that aerobic exercise can reduce the ambulatory and resting blood pressure. In another study, it was suggested that short exercise intervals as short as 10 minutes have the same post exercise hypertension effects as longer intervals such as 40 minutes (McNeil, 2016).

**Health Literacy**

Sorensen et al. (2012) have identified 17 health literacy definitions. The WHO’s 1998 definition of health literacy provides the core definition of health literacy. Health literacy is defined as an individual’s cognitive and social skills that provide them with abilities and motivation to obtain and use information in promoting and maintaining good health. Health- literacy has been studied since 1970, when it was found to be an important factor in public health outcomes. The literate was defined as an individual with the ability to read and write, but literacy was identified to have broader effects on both individuals and society. Literacy could result in contextual, individual, and social transformations. Contextual transformations have resulted in economic growth and social transformations have resulted in socio-cultural and political changes (Sorensen et.al., 2012).

Health literacy is not about the ability to read or write; rather is addresses a person’s ability to understand how to manage their health. Health literacy level correlates with an individual’s knowledge regarding their health behaviors, which can result positive outcomes and reduce medical costs (Baker, 2006).

The Institute of Medicine (IOM, 2004) and WHO (1998) definitions are the most cited definitions in describing health literacy, and both of these definitions assisting individuals to obtaining and understand health information and taking necessary actions to improve their health. However, the IOM (2004) definition considers health literacy as interaction between an individual and his/her society. Further, IOM (2012) reported that more than half of Americans may have difficulty in dealing with health information, referred to as “health literacy epidemic” (Sorensen et al., 2012).

The Patient Protection and Affordable Care Act of 2010, Title V, defines health literacy as the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decision (The Patient Protection and Affordable Care Act, 2010). The US Department of Health and Human Services updated the definition to include personal health literacy and organization health literacy. Personal health literacy is the degree to which individuals have the ability to find, understand, use information and services to inform health-related decisions and actions for themselves and others. Organizational health literacy is the degree to which organizations equitably enable individuals to find, understand, use information and services to inform health-related decision and actions for themselves and others. These new definitions emphasize people’s ability to use health information rather than just understand it, and focus on the ability to make “well-informed” decision rather than “appropriate” ones. They also incorporate a public health perspective acknowledge that organizations have a responsibility to address health literacy (The US Department of Health and Human Services*,* 2020).

There are 12 conceptual models of health literacy. One of these conceptual models is the Nutbeam (2000) Model. Nutbeam divided health literacy to three classes: 1) functional health literacy, 2) interactive health literacy, 3) critical health literacy. **Functional health literacy** is the manifestation of basic skills such as effective reading and writing, which can lead to an improved knowledge of health-services. **Interactive health literacy** is an individual’s ability to act independently with more self-confidence and refers to higher cognitive abilities that allow an individual to obtain and analyze information from different forms of communication and apply them in any situation. **Critical health literacy** is considered to be the highest cognitive and social skills that enable a person to critically analyze information and use it to gain control over life events and situations. Critical health literacy shows that a person with extended knowledge can act with greater autonomy and is empowered to make health related decision.

These three types of health literacy are applicable to the public as well as to individuals. Functional health literacy strategies, when implemented in the community, could result in an increase in use of community health programs. The interactive health literacy influences social norms and critical health literacy empowers the communities to act on social and economic factors that affect their health (Sorensen et al. 2012).

Du et al. (2018) equated the above literacy categories to skills. Functional health literacy is described as functional skill, and defined as an individual’s ability to read and understand written materials. Interactive skill is defined as an individual’s ability to effectively communicate with her/his healthcare provider. Critical skill is defined as individual’s ability to make appropriate health decision (Du et al., 2018).

Zarcadoolas et al. (2003) defines civic literacy as skills and abilities of public to be aware of public issues and to be involved in the decision-making process. Cultural literacy is defined as the ability to take an action on health information based on an interpretation of collective beliefs, customs, world-view, and social identity (Sorensen et al., 2012).

Mancuso (2008) defines health literacy as an evolving process throughout a person’s lifetime related to an individual’s capacity skills, comprehension, and communication. Capacity skills are high cognitive skills that enable individuals to set a goal and achieve it. In doing so, individuals gather, analyze and evaluate health information, and seek guidance to achieve their goals. The communication skill is complex as it involves decoding information that are received as verbal, written or behavior signals. However, the essential communication skills are considered to be reading, writing and speaking (Mancuso, 2008).

The Health Literacy Survey-Europe (HLS-EU) conceptual model for health literacy in 2012 followed the Nutbeam to establish a comprehensive conceptualization of health literacy. HLS-EU identifies four different levels of competency or skills in the three domains of health: healthcare, disease prevention and health promotion. The competency levels were identified as accessing, understanding, appraising, and applying health information. The Functional, Communicative, and Critical Health Literacy Scale (FCCHL) and Health Literacy Questionnaire (HLQ) are the only two health literacy scales that are developed based on this broader definition of health literacy (Radmakers & Heijmans, 2018).

In searching for other definitions of literacy, Frankel et al. (2016) define literacy as “The process of using reading, writing, and oral language to extract, construct, integrate, and critique meaning through interaction and involvement with multi-modal texts in the context of socially situated practices” (p.7). In this definition, the authors suggest that literacy is a combination of four elements of writing, reading, speaking, and listening. These four elements divide literacy to two dimensions of constructive (writing and speaking) and receptive (reading and listening). These four elements of writing, reading, speaking, and listening are affected by an individual’s social interactions and practices. The individual’s social and cultural backgrounds are considered vital for individuals to understand the content of reading materials (Frankel, Becker, Rowe, & Pearson, 2016).

The National Assessment of Adult Health Literacy found that over one third of adult population in the U.S have limited literacy skills. Racial and ethnic minorities are affected by limited literacy skills at a higher rate when compared to the rest of the population. There is a lack of systemic evaluation of health literacy in the healthcare system. So, it is reasonable to consider low health literacy as a problem of the healthcare providers rather than the patients, as the healthcare system is not equipped to evaluate health literacy by any standard measures, nor does it have organized planning to improve the health literacy of patients. Limited health literacy is identified as the key risk factor contributing to health care disparities and lower quality of care, which is more prevalent among underprivileged populations including racial/ethnic minority groups and individuals with limited English proficiency, limited literacy level, and low educational level (Hasnain-Wynia & Wolf, 2010).

**Effects of Health Literacy on Health Outcomes**

Health literacy is recognized as an important factor in controlling blood pressure in individuals with HTN. HTN is considered a risk factor for stroke, heart disease, and renal dysfunction. Lifestyle modifications and self-management are factors in achieving optimal hypertension. Individuals with hypertension have better outcomes when they have a higher health literacy, which is secondary to a better understanding of instructions and recommendations that are provided to them by their healthcare providers (Du et al., 2018).

Health literacy has an important role in public health, since it has been shown to improve health promotion and health outcomes of individuals in different populations. For example, health literacy has been shown to have positive effects on how the elderly population manage their health problems later in life, and also positively correlates to individual’s level of self-care at home post discharge from hospital/out-patient/ambulatory settings. Moreover, it improves the health outcomes with an ultimate reduction in 30-day readmission rate, which is important in today’s value-driven healthcare system (Parnell et al., 2019).

Health literacy is complex and is considered to be a combination of print and oral literacy in addition to numeracy skills. Print literacy is the combination of reading and writing, and is described as an individual’s ability to read and understand the written materials. Oral literacy is the combination of speaking and listening, and is defined as an individual’s adequate speaking and listening skills. Numeracy skill is considered as the ability to do simple math related to medication calculation. An individual’s need to have all these skills in order to understand printed materials, have effective communications, and do simple math (Keefe & Copeland, 2011 & Macleod et al., 2017).

Higher health literacy has been shown to increase health related self-report, and health knowledge with subsequent reduction in use of healthcare services, shorter hospitalization, and lower healthcare costs. Baker (2006) revealed that better health outcomes correlates to individual’s positive health behavior and attitudes, which results in seeking new knowledge and greater self-efficacy (Sorensen et al., 2012).

Patient’s health is affected by health literacy, but their age, income, employment status, education level, race and ethnic groups also affect their health. People with poor health literacy have been identified to have riskier behavior and make fewer healthy choices. This trade of risky behavior can result in poor health outcomes, more hospitalization and increase in healthcare cost. Health affects patient’s survival, longevity and quality of life. The health risk factors can be categorized into internal, external, and self-inflicted. Examples of such health risk factors are war, famine, noise, workplace stress, unhealthy diet, obesity, pollution, physical inactivity, financial insecurity, and poor housing. In the United States (U.S.), the consumer’s decision making is affected by existing public policies. The U.S. is one of the two countries in the world that has direct-to-consumer marketing law. The law allows the pharmaceutical companies to directly advertise to the patients. These advertisements are market driven and make decision making more difficult for the patients. The population’s health is affected by unhealthy diet and life-style, which are the result of sophisticated marketing tools and techniques promoted in the modern society (Lytton, 2013).

Patients with low health literacy level have 14% higher risk of nonadherence when compared to patients with high literacy level. Poor health literacy is associated with an inadequate use of preventive services and subsequently delayed diagnoses with increased risk of hospitalization and mortality. Improving health literacy can be effective in increasing patient’s adherence, and implementing strategies such as educating patients and increasing understanding and use of preventive tools can increase patient’s participation in decision making and understanding the plan of care and expected follow ups. These interventions have been effective more in low income population. The rate of low health literacy is 1.5 times higher when no interventions were implemented, however implementing appropriate interventions has improved the health literacy by 2.45 times (Miller, 2016).

Self-management and treatment adherence have been identified as major factors in chronic disease management, and these factors are affected by patient’s comprehension and knowledge. Health literacy level correlated directly with patient’s knowledge and comprehension ( Poureslami, Nimmon, Rootman, & Fitzgerald, 2016). Poor health literacy can result in poor communication between health care providers and patients. Healthcare providers are in a position to improve patient’s health literacy and they are the source of health information for the patients and are responsible to communicate this information to their patients. Adequate health literacy can improve population understanding and usage of preventive measures and healthy lifestyle. Patients with adequate health literacy have a better understanding of long-term benefits of healthy lifestyle (Patrick, et.al., 2017).

**Health Literacy Screening TESTS**

There are nineteen health literacy screening tests to measure health literacy. The most popular ones are described by date of origin, country of origin, purpose, population, domain, timing and scores (Appendix A). These screening test differ in techniques that are used to evaluate patient’s health literacy. There tests are divided to the three categories: evaluating individual’s abilities, individual’s self-reported abilities, and population health literacy. The tests that measure individual’s abilities are Rapid Estimate of Adult Literacy, REALM-shortened version (REALM-R), REALM-Short Form (REALM-SF), SHORT Assessment of Health Literacy for Spanish Speaking Adults (SAHLSA), The Medical Achievement Reading Test (MART), Test of Functional Health Literacy (TOFHLA), short version of TOFHLA (S-TOFHLA), and Newest Vital Sign (NVS) (Jordan, & et.al., 2011).

The Newest Vital Sign (NVS) (Appendix B) is a valid and reliable screening tool available in English and Spanish that identifies patients at risk for low health literacy. It is easy and quick to administer, requiring just three minutes. In clinical settings, the test allows providers to appropriately adapt their communication practices to the patient’s health literacy level. Researchers have used the instrument to measure health literacy and evaluate the impact of low health literacy on a variety of health outcomes. The Newest Vital Sign is one of the Pfizer’s Inc’s most important contributions to the health literacy movement and has been researched extensively by health literacy experts. In a recent systemic review, the NVS performed moderately well in identifying patients with limited health literacy. The Newest Vital Sign was developed to assess reading, interpretation, and numeracy. The difference between the NVS and other screening tests is that an interviewer would ask six questions that are based off an ice cream nutritional label. Patients would be categorized based on their scores to high/likelihood of limited literacy (Score 0-1), possibility of limited literacy (Score 2-3), and adequate literacy (Score 4-6) (Jordan et al., 2011).

The Newest Vital Sign (NVS) was developed in 2005 to measure reading, comprehension, and numeracy by having patients read nutritional label and answer a 6-item questionnaire about the label. However, this screening test has not been evaluated in low-income population (Ylitalo et al., 2018). The NVS test can be completed in three minutes and it allows for a quick assessment in a primary setting. Each of the six questions address one component of the data on the NVS tool (Heinrich & Karner, 2011). The NVS test is available in Spanish. The area under the ROC curve for the NVS was slightly higher than 0.69 (95% CI, 0.62-0.76; p < .001) for educational level and was 0.64 (95% CI, 0.56-0.71; P < .001) for age (Weiss et al., 2005).

There has been an argument that disease specific measurements have benefits over generic instruments. These tests measure disease related health knowledge of an individual and identify disease management deficits, and subsequently can improve the disease management and its outcomes ( Elbashir, Awaisu , El Hajj, & Rainkie , 2019).

Higher health literacy has been shown to increase both health related self-reporting and health knowledge, which leads to a subsequent reduction in use of healthcare services, shorter hospitalization, and lower healthcare costs. Baker (2006) revealed that better health outcomes correlate to an individual’s positive health behavior and attitudes, which result in seeking new knowledge and greater self-efficacy (Sorensen et al., 2012).

Health literacy is multi- dimensional and is related to many areas of the health-care improvement as illustrated below:

Personalized Medicine Health Communication Health IT

Patient Safety **Health Literacy** Health Care Quality

Medical Home Health Care Equity Care Coordination

The intersection of Health Literacy with Health Care Improvement

Adopted from Hasnain-Wynia & Wolf, 2010

**Literacy**

The National Institute for Literacy (1991) defined literacy as ability to read, write and speak in English, and being able to do basic daily numeracy. These skills were considered to be essentials for individuals to be functional in the society (Mancuso, 2008)

In searching for other definitions of literacy, Frankel et al. (2016) define literacy as “The process of using reading, writing, and oral language to extract, construct, integrate, and critique meaning through interaction and involvement with multi-modal texts in the context of socially situated practices” (p.7). In this definition, the authors suggest that literacy is a combination of four elements of writing, reading, speaking, and listening. These four elements divide literacy to two dimensions of constructive (writing and speaking) and receptive (reading and listening). These four elements of writing, reading, speaking, and listening are affected by an individual’s social interactions and practices. The individual’s social and cultural backgrounds are considered vital for individuals to understand the content of reading materials (Frankel et al., 2016).

Functional literacy could be influenced by factors including language, cognitive, and numerical deficits. People who are functionally illiterate demonstrate deficits in domains of oral and reading comprehension and verbal fluency. They also show poor cognitive performance in visual organization, visual memory, and sustained and split attention tasks; these individuals also have poor mental calculation skills when tested by written tests. It was suggested to use formal educational/schooling to estimate functional literacy level, however this would not be achieved globally as formal schooling varies among different cultures and countries (Vagvolgyi, Coldea, Dresler, Schrader, & Nuerk, 2016).

Reading literacy is the comprehension and analyzing of a written text to achieve individual’s goals, develop knowledge and be engaged in society. Reading literacy was found to be the key component of academic achievement in middle and high school students (Holloway, 1999), however Cunnigham and Stanovich (1998) believe that it’s essential for success in all areas of the education system and further success in adult life (Delgadova, 2015).

Critical literacy is focused on promoting social justice by teaching individuals how to use literacy to discover discrimination and unfair treatments in social relationships, culture, and media and to take action against these injustice treatments. Critical literacy is important as it related to a broad context of art, music, and visual text. Harste (2003) consider art, music, movement, and visual text as part of literacy, and literacy as a social skill. The critical literacy differs from critical thinking, critical thinking is considered to be higher level of cognitive thinking which is used to solve problems (Lee, 2011).

The National Center for Education Statistics also published description of 3 types of literacy, Functional English literacy is assessed based on different types of printed or written materials. These written or printed materials can be defined in 3 classifications of Prose literacy, Document literacy, and Quantitative literacy. Prose literacy is the ability to perform tasks such as comprehension and understanding of editorial, news stories, instructional materials and brochures. Documentary literacy is the ability to perform tasks such as filling out job applications, reading maps, drug or food labels. Quantitative literacy is mathematical ability to be able to understand numbers in printed materials such as checkbook, height/weight measurement, and other daily activities that requires math (The National Center for Education Statistics, 2003).

There are three types of Functional literacy identified as 1) Prose, 2) Document, and 3) Quantitative. Prose literacy is skills needed to read and understand printed material. Document literacy is skills needed to locate and use information, such as tables, maps, charts, job applications, and payroll forms. The quantitative literacy is skills needed to apply arithmetic knowledge, for example use of numbers embedded in print materials (Rudd, 2007).

The United Nation Educational, Scientific and Cultural Organization (UNESCO) defines literature as the ability to read and write. The literate person is identified as one who can understand reading and writing and uses the information in performing activity of daily living. This definition by UNESCO doesn’t include people with disabilities and others who need support in becoming literate; they are excluded from the right to literacy instruction by this definition. (Keefe & Copeland, 2011).

**Literacy Categories**

The United Nation Educational, Scientific and Cultural Organization (UNESCO) recognizes literacy as a human right and not a privilege. Knoblauch (1990) describes four types of literacy including functional literacy, cultural literacy, critical literacy and Literacy for personal growth (Keefe & Copeland, 2011). Functional literacy**,** is the learned set of skills including writing, reading and math skills that enable a person to be effectively functional in personal and community activities (Keefe & Copeland, 2011). Bhola (1995) stated that reading and writing is a basic human right and individuals should be functionally literate in their own culture. Functional illiteracy is more prevalent in developed countries however illiteracy is seen more in developing countries (Vagvolgyi et al., 2016).

The U.S. Department of Education measures health literacy of American’s adult by functional English literacy which is based on assessing different types of printed or written materials. These written or printed materials can be summarized in three classifications of: 1) prose literacy, 2) document literacy and, 3) quantitative literacy. Prose literacy is the ability to perform tasks such as comprehension and understanding of editorial, news stories, instructional materials and brochures. Documentary literacy is the ability to perform tasks such as filling out job applications, reading maps, drug or food labels. Quantitative literacy is mathematical ability to be able to understand numbers in printed materials such as checkbook, height/weight measurement, and other daily activities that requires math (Kutner, Greenberg, Jin, & Paulsen, 2006).

The U.S Department of Education provided a scale for measurement of individual’s functional literacy level. Individuals are categorized to four literacy level based on individual’s collective score on the three types of functional literacy (prose, documentary and quantitative). The four literacy levels are 1) Below Basic, 2) Basic, 3) Intermediate, 4) Proficient.

The Below Basic level is the lowest level and reveals basic concrete literacy skills. The individuals collective score level ranges from 0-234. The individuals with score of 205-289 are in the basic level, however their abilities are still limited to perform simple tasks of daily living. The intermediate level, individuals can perform moderately challenging activities and have collective score ranges from 250-349. Finally, individuals with collective score ranges from 340-500 are the individuals who are able to perform complex literacy activities and fall under proficient level (Kutner et al., 2006).

**Health Dimensions**

Health has three dimensions: healthcare, disease prevention and health promotion. All these three dimensions collectively affect the quality of life of an individual. Health literacy is a combination of knowledge, motivation, and competencies that enable an individual to access, understand, appraise, and apply health information in all three dimensions of health. Health literacy has three classifications: functional health literacy, communicative or interactive health literacy, and critical health literacy (Roediger, Immonen-Charalambous, Kujawa, & Sorenson, 2019).

**Factors Influencing Health literacy**

Aging has been identified as a factor related to limited health literacy. One study revealed that by 2060, one third of the European Union will be 65 or older. Individuals with limited health literacy have been shown to have limited comprehension as well as decision making skills, which result in less use of preventive and healthcare services (Roediger et al., 2019).

The aging population is becoming the majority age group throughout the world and the elderly population requires more medical services, which results in rising healthcare cost. Health promotion and disease prevention have been found to be effective in reducing healthcare cost, and health literacy was found to be a key contributor in increasing health promotion for both individuals and healthcare providers. Health literacy was also found to be a factor in increasing access to health information and reducing disparities in access to health information. (Taguchi, Murayama, & Murashima, 2016).

The National Assessment of Adult Literacy in 2003 revealed gender, race/ethnicity, age, education level, insurance type, and socio-economic status as factors that influence health literacy. The major difference in health literacy score was observed between different genders; women score 6 points higher than men on average. White and Asian/Pacific Islanders scored higher compared to Black, Hispanic, American Indian, Alaska Native, and Multiracial adults. Older adults, age 65 and older, were among individuals with low average literacy score. Higher literacy was seen among individuals with higher education level (high school or higher). Education level is positively correlated with literacy level. Socio-economic factors were found to have a great impact on health literacy. Lower socio-economic status results in lower health literacy level. Health literacy level was also found to differ among individuals with different insurance providers; health literacy was lower among Medicare/Medicaid insured individuals and individuals with no insurance (Kutner et al., 2006).

There are several social factors that have impact on health literacy. These factors include socioeconomic status, occupation, employment, income, social support, environmental, political forces, media use, culture, and language. The factors that influence health literacy on the personal level are related to age, race, gender, cultural background, vision, hearing, verbal ability, memory, reasoning, physical abilities, and social skills (Sorensen et al., 2012).

In addition to factors that affect health literacy, Macleod et al. (2017) described 3 different characteristics of individuals with low health literacy level, which included demographic characteristics, mental health characteristics, and physical health characteristics. The demographic characteristic of individuals with low health literacy were described as mostly being male gender with low income status from minority groups. The mental health characteristics were described as impaired cognitive functioning, poor decision making, and individuals having less social support. The physical health characteristics were described as not being inclined to engage in health promoting behaviors and having reduced physical functioning (Macleod et al., 2017).

Socio-economic status, psychological factors, and material factors are influential on individual’s health literacy. Socio-economic status affects both psychological and material factors, as it is indicative of individual’s income, occupation, educational level, housing, working condition, and community resources. Moreover, a community has a vital role in providing individuals with access to health institutions, medications and treatment, sports, natural landscape, and healthy food (Ruegg & Abel, 2019).

Individuals with low socioeconomic status were found to have poor health literacy and lower educational level. These individuals also were found to have a tendency to have chronic conditions such as hypertension, diabetes, stroke and chronic pulmonary disease (Peterson et al., 2011).

Health literacy was also found to correlate with health insurance literacy. It has been shown that higher health literacy correlates with higher level of health insurance literacy. Recent national studies have shown that only 4% to 14% of individuals were capable of basic understanding of health insurance. Individuals with low socioeconomic status, individuals from racial/ethnicity minority, and older individuals were found to be among individuals with low health insurance literacy. Previously uninsured individuals are inclined to have lower understanding of basic health insurance. Low health insurance literacy reduces preventive care use by individuals; this is only secondary to fear of the cost. Some of these services such as cancer screening and vaccinations have been offered free of charge under the American Care Act. Low health insurance literacy level affects medication adherence, which is only secondary to not knowing the coverage and out of pocket cost (Tipirneni et al., 2018).

In summary individual factors that influence health literacy are age, gender, cultural background, vision, hearing, verbal ability, memory, reasoning, physical abilities, social skills, and education.

**Electronic Health Information**

Electronic health literacy was established in 2006 based on the notion of using web-based health information as the source of health information and enabling individuals to obtain, evaluate, and make decisions based on this information. The goal of e-Health was to create a positive health-outcomes for patients based on collaboration between patients, providers and healthcare system. However, eHealth literacy can’t be described as an isolated skill of an individual; it is developed as a function of an individual’s functional, health, and technological literacy skills. Personal, relational, knowledge and technological factors can affect e-health skills. Personal factors such as age, income, education, marital status, race, and ethnicity influence e-health literacy as well as all other literacy classes. Relational factors are the individual’s social influences, which affect linguistic abilities and remove cultural barriers in obtaining health information. Knowledge is an individual’s choice in selecting the type and amount of health information that they would like to obtain about any health-related concerns. Technological factors concern about individual’s willingness to use technology and devices to obtain health information (Paige et al., 2018).

The recent digital age of information brings our attention to electronic health resources. E-Health literacy is described as the ability to obtain, analyze, and apply health information from electronic sources to promote health. There are six core skills that are required to optimize eHealth literacy outcomes. Patients don’t have to be highly trained in all six core skills to be sufficient in eHealth literacy, however moderate capability in all six core skills is required to optimize the outcomes. These six core skills are traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy. These six core skills can be further divided into two categories: analytic and context specific. Traditional and media literacy are considered to be part of analytic category, which covers a broad range of information sources without considering topic or context. Computer, scientific, and health literacy are part of context -specific category, in which information sources are contextualized towards a more specific problem. Traditional literacy is based on basic skills of writing, reading, comprehending and numeracy. The World Wide Web is text dominant and 65% of its content is in English. Information literacy is defined by the American Library Association as finding information and using it in such a way that others can learn from it.

Media literacy is combination of cognitive and critical thinking skills to obtain and analyze information that is provided by media. Scientific literacy is the systemic understanding of how knowledge is created based on the nature, aims, methods, application, limitations, and politics involved in the process (Norman & Skinner, 2006).

**Patient Education Initiation**

Patient education is embedded within health promotion field, and is essential part of communication between patients and healthcare providers. The professional development of patient education is new as the scientific journal Patient Education and Counseling was established in 1976. Patient’s responsibilities as having active role in their care was recognized in 1974, prior to that patient’s role was considered to be passive. Physicians have the authority to diagnose and treat patients, and patients were not allowed to participate at their care at all.

However, this view was changed by European countries especially Netherland in leading in the early development of patient education in primary healthcare, the governmental simulation of patient education in hospitals, and by researching its effectiveness. In the United States, Nursing organizations and nursing profession brought the attention to physician-patient communication and furthermore development of patient education. The first communication courses for healthcare providers were still being developed in the 1970 and information brochures were not developed in a systemic way. Patient education was more supported in 1980, and was developed secondary to social pressure on patient’s right and growth of advocacy organization. Patients’ role in their care was changed and patients considered to have active role in their care in 1990. Health promotion concept has changed over time from transferring knowledge to introducing and applying new terms such as self-efficacy and social influences. The goal of care was changed from achieving good health at all cost to quality of life (Hoving et al., 2010).

**DNP Project Purpose and Aims**

The purpose of this DNP project was:

1. Assess health literacy levels of adult patients ages 19-64 years

who received their care at McAuley Center to determine the percentage of patients with

low health literacy, at -risk for low health literacy, and adequate health literacy level for

hypertension.

1. The second aim of this project was the development of tailored hypertension health

literacy handouts for those with low and at-risk for low HTN health literacy, and

those who had adequate health literacy level.

This DNP project was approved as an expedited review from the IRB at the University of

Detroit Mercy.

There was no collection of any identifiable information from patients such as age, gender, and ethnicity.

**Project Deliverables**

This study is developed to assess the level of health literacy of adult patients (ages 19-64 yrs), 98% of which are African-American adults with hypertension receiving care at the McAuley Health Center for HTN. This quality improvement project sought to assess the health literacy levels of adult patients.

The McAuley Health Center has been providing primary care services to persons of color in the poorest zip code in the city of Detroit. This nurse managed clinic cares for diverse populations in the local community. HTN is the most prevalent health condition in the clinic with the following diagnoses: 1) hypertension, 2) obesity, 3) osteoarthritis, and 4) mental health conditions. The implementation of the health literacy screening and the development and sustainability of those handouts can be maintained and ultimately may improve HTN outcomes at the center.

**Handouts development**

The NVS and oral literacy provided the levels of HTN health literacy and the DNP student then created three levels of handouts after reviewing clinic’s handouts and simplifying them to:

1. 100 handouts for those with low level HTN literacy.
2. 100 handouts for those with at-risk for low HTN literacy.
3. 100 handouts for those with adequate level of HTN literacy.

The handouts were color coded, green for adequate HTN literacy; Blue were classified

for at-risk HTN literacy; and red folder were for those with low HTN literacy (Appendix C).

The lead-Np at McAuley Health Center participated in this process and implemented the handouts and matched the patient’s level of understanding with the appropriate handouts. The lead-Np and the providers at the McAuley Health Center will be following those patients and evaluating the patient’s knowledge regarding their hypertension.

The percentages of health literacy among the assessment identified the following percentages of patients that: 1) had limited health literacy for HTN (94.8%), 2) adequate health literacy (5.12%), and 3) are at-risk for low health literacy for HTN (0%). Using these percentages, patient handouts were developed for low literacy (Appendix D), adequate literacy, and at-risk literacy level. The DNP student developed these handouts and provided them to the clinic for use in practice to help improve hypertension outcomes.

Information from the American Heart Association and the American College of Cardiology support the importance of patient education so participants can learn to manage their condition. Standard hypertension handouts that are part of the clinic education materials were obtained from the clinic. The American Heart Association (AHA) hypertension recommendations and clinic’s blood pressure instructions were reviewed and two new blood pressure instructions were developed, one for at-risk patients and the second for low-literacy level patients. The simplified instructions were a combination of graphic illustrations and short, direct sentences focusing on hypertension identification and measurement, food label education (especially on salt intake), and a simplified exercise regimen.

The at-risk and low-literacy level handouts (red and blue folders) especially were designed in simple illustrative pattern with simple sentence structure. Both handouts simply explained to patients the definition of HTN; that the term “hypertension” means high blood pressure. Patients were educated that blood pressure is described in two numbers, an upper and lower number, and when the upper number is more than 120 and the lower number is more than 80, the patient has hypertension or high blood pressure.

Patients also were educated about how to measure their blood pressure; an illustration of blood pressure measurement was added to make patients visualized the technique. Sodium intake was addressed in the handouts that are provided to the patients. The study goal is to simplify the low salt diet recommendations for the patients and enable them to easily identified salt levels on food labels. Patients were provided with printed food labels with highlighted sodium level on the label. Patients were instructed to keep the salt intake maximum at two gm or 2000 mg a day.

Handouts include simplified exercise regimen for the patients. An exercise regimen of 30 minutes a day was simplified to frequent short intervals of 10 minutes, 3 times during the day. The lead NP, who is the primary care provider of most of the patients in the clinic, was provided with the Newest Vital Sign literacy test and three folders. It was decided by the lead NP that the patient’s literacy level will be evaluated by oral literacy to reduce exposure time in the setting of covid-19 pandemic and staff shortage in the clinic. After identifying patients’ literacy level, patients were provided with the tailored blood pressure instructions based on their literacy level.

**Data Collections**

Thirty-nine patients (n = 39) with an age over 40 and a history of HTN were evaluated and received handouts based on literacy level after their visit were completed in the clinic. Patient’s literacy level evaluation made more accurate based on lead NP’s vast knowledge about patient’s literacy level secondary to knowing those patients and treating their HTN for past 3 years. Thirty-seven patients (94.8%) received low literacy level; two patients (5.12%) received high literacy level. No patients received at-risk literacy level handouts.

**Results**

There were 39 patients (n= 39) in total who received HTN handouts based on their literacy level. The result was obtained mainly based on patient-reported outcome (PRO) secondary to covid-19 pandemic and required social distancing and PPE preservation. Sixteen patients (41%) followed up after they received the handouts and they reported differently in how the handouts were effective in improving their HTN management. Five patients (31.25%) reported improvement in their blood pressure level. Five patients (31.25%) reported better compliance with their medications. Six patients (37.5%) reported improvement in their general knowledge about HTN management.

Twenty- three (58.9%) patients didn’t follow up after their visit. The reason for not following up is unknown, several factors could be the participating factors including: covid-19 pandemic with its economic and social restrains that opposed on the patients, or the clinic change of management which could interrupted the care, or this could be presentation of patients being non-compliance.

**DISCUSSION AND IMPLICATIONS**:

The lead NP and patients were appreciative for the handouts as it was reported by the lead NP. HTN is a chronic disease and patients usually are under supervision of a healthcare provider for an extended period of time. HTN has been managed by pharmacological and non-pharmacological strategies. Most hypertensive patients never achieve optimal blood pressure levels.

1. **Health literacy**, **evaluation, standardization**

Healthliteracy is identified as the key element in communicating effectively with the patients. Functional health literacy is a combination of oral, written, and numeracy skills that patients need in order to understand existing handouts and to better communicate with their providers.

Functional health literacy level is not evaluated at the primary, secondary or tertiary healthcare settings. As the result of that, patient’s understanding level is unknown to their providers. Time, cost, and lack of standardized testing were identified as the major obstacles in obtaining health literacy level. There are nineteen health literacy tests available to healthcare providers, and each one of them evaluates patients for different set of skills including writing, reading, and numeracy. Patients need all three skills to be able to understand health information and navigate through healthcare system. Patient’s critical and interactive literacy are the higher level of cognitive skills and are not evaluated in healthcare systems.

Patients face challenges from the healthcare system as it is becoming more digitalized. Patients need to know how to work with a computer or cell phone and have access to reliable digital network to be able to make appointments, receive test results, and follow ups. This is another obstacle for the low-income populations.

To overcome these challenge, Nurse Practitioners are becoming more involved in patient’s care and their education, as they are identified as better educators in the healthcare system. Patients with chronic disease have to self-manage their disease, and in achieving that goal they need to be educated and understand their disease process. A tailored instruction based on a patient’s literacy level can improve the communication level between patient and their healthcare provider and ultimately can improve the patient’s outcome.

1. **Education Handouts**

As the literature review demonstrates, most of the education handouts are written at high

school level, and it has been proven this level of written materials is hard for many patients to understand. The standard education material that was provided in the clinic was simplified for this project. The new handouts had short and direct sentences with big fonts. No medical terms were used. Due to the size of the handouts, only the first page of Low-literacy level handout is presented at this paper (Appendix C). Patients reported that the handouts were simple for them to understand and it was easy to follow the instructions. This may call for action to develop individual based education handouts in primary, secondary, and tertiary healthcare settings to improve health outcomes.

2)**Low-income /underprivilege population and socioeconomic Factors: Economy, insurance, medication adherence, non-pharmacological treatment of HTN (diet, exercise)**

Underprivileged population face additional challenges when facing chronic disease management. There are individuals with insecure income and occupation. Most of these individuals have low educational level and live in poor housing and community condition. The non-pharmacological interventions are broad and relate to socioeconomic status and education level. The recommendations are heavily based on following the DASH diet and exercise. These interventions have failed underprivileged populations as patients in these populations have limited food resources and lack of environmental requirements such as parks or safe sidewalks to exercise.

Lack of resources such as access to healthy food can affect their efforts in managing their HTN. It has shown that lack of resources to healthy food can contribute to obesity and developing or worsening of HTN. Lack of healthy food is not uncommon in underprivileged communities. Financial insecurity is common in underprivileged/low-income populations. This can limit access to healthy food, and adherence to medications. It can cause stress as they are not able to take care of themselves or family members, which can worsen their HTN. Healthy food is one of the non-pharmacological recommendations in treating HTN. Thus, having access to healthy food is essential in treating HTN.

The other non-pharmacological strategy for treating HTN is exercise. However, most low-income/underprivileged populations are unable to afford a gym and their housing and community setting are not supportive of healthy living. Insurance is another element which plays a vital role in HTN treatment. The type of insurance and their coverage can help with medication adherence and clinic visits.

These factors and other socioeconomic factors such as occupation, employment, income, social support, environmental and political forces, and culture can have an enormous impact on HTN outcomes, but are not evaluated in healthcare settings or in this. These factors should be addressed at local and federal government with an implementation of policies to support these communities and improve their general health.

**LIMITATIONS/STRENGTHS**

There are several limitations of this study to acknowledge. First, this study was small. There were only 39 patients enrolled in this study and result may not be generalized to a general population. Second, not all the participants completed their follow ups. The reason is unknown as it could be related to covid-19 pandemic with its economic and social restrains opposed on the patients, or the clinic change of management which could interrupted the care, or this could be presentation of non-compliance. Third, the DNP student was not able to personally do the follow ups due to covid-19 restrictions and limitations to reduce exposure, preserve PPE and social distancing. Finally, this study didn’t evaluate the other factors including socioeconomic and cultural factors that can influence the health outcomes.

There are couple of strengths to the study to acknowledge. The study was the first step to introduce evaluation of health literacy level to be routinely performed at the clinic visit, especially in low-income settings. The second strength of the study was a development of tailored health education handouts based on patient literacy level to improve their health outcomes.

**EVALUATION Of The PROJECT**

This projectis one of the quality- improvement projects with a focus on health literacy and education handouts to improve health outcomes. Health literacy had been introduced to the medical community for many years, however it has not been standardized and routinely performed in the primary, secondary, or tertiary healthcare system. Patients have been receiving education handouts in the areas of disease prevention, and health promotion without being asked if they can understand the education materials or if they found them helpful. Most education materials are written at literacy level much higher than the average literacy level of a patient. Many of the patients with HTN have never achieved optimal blood pressure control, and lack understanding of disease process, treatment, and prevention, which could play a vital role in achieving optimal blood pressure management. It would be beneficial to consider patient’s literacy for developing education materials and modify the existing education handouts to patient’s need. The evaluation process was performed from the perspectives of: 1) patients, 2) lead NP, and 3) DNP student.

Patients reported that they were so thankful to receive the handouts as they found them helpful. They reported that the handouts were easy for them to read and understand. Patients also reported that handouts instructions were easy to follow. They reported that the handouts, in some cases, increased their knowledge level about HTN, and in some cases even improved their HTN level. The long-term effects of this study is unknown, but as previous studies showed there is possibility that increased knowledge level can improve the HTN outcomes in the long-term.

The lead NP in the clinic was so excited about receiving the handouts and about this collaboration. She accepted to participate in this study despite shortage of staff in the clinic, and management change and covid-19 pandemic. She found the handouts were helpful when patients reported that the handouts increased their knowledge about HTN, and in some cases improved their HTN management. The handouts were easy to identified as they were color coded (red, blue, green folders) for the lead NP.

The DNP student, completed a journey of planning and implementing a quality improvement process. The project was completed by having frequent contacts with the lead NP to discuss the project, implementation and the results. It was an illuminating fact that how many patients with chronic disease don’t know about their disease and its management based on data gathered from this study (even though the study was small).

This study showed that health literacy is a key to unlocking the door to better health outcomes in any settings, from primary to secondary to tertiary healthcare system. However, functional health literacy is one aspect of patient’s literacy level. Health literacy is complex, and more studies are needed to understand how to help patients to understand their health problems, treatment, and follow-ups. More is needed to be done to standardized the health literacy testing and its implementation in the healthcare system. The education handouts should be tailored to individual’s needs to improve health outcomes. Nurse practitioners are becoming more involved in patients’ care than before and they can move the healthcare system toward more individual based education as their background is more focused on education and counseling.

**Appendix A**

**Health Literacy Screening Test (Measurement of Individual Abilities)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name Test | REALM | REALM-S | REALM-Teen | SAHLSA | MART | TOFHLA | S-TOFH  LA | HHLT | NVS |
| Country | USA 1991 | USA 1993 | USA 2006 | USA 2006 | USA 1997 | USA 1995 | 1999  USA | Israel 2007 | USA 2005 |
| Purpose and Population | Identifying patients with limited reading skills and estimate patient reading level in primary care | Identifying patients with low reading level in primary care | Screen youth in grades 6-12 for below grade reading | Develop an easy to use health  literacy test for Spanish speakers in health care settings | To identify illiterate patients of high school age or older in the general community | Understand and  measure functional health literacy in patients in health care settings | Measure  patients’  ability to read,un-derstand  health-related materials in the health  care system | Assess health  Literacy in Hebrew patients in Israel  Health  System | Screen for  Limited Literacy in  patients  in primary health care settings |
| Domain | Single domain 125 items | Single domain 66 items | Single domain 66 items | Single domain 50 items | Singl-e doma-in 42 items | Two domains: reading( 50 items)  Numerac-y( 17 items) | Two  domains:  reading  36 items)  Numerac-y (4 items) | Two  do-mains:  reading ( 8 items) Numeracy 4 items | Single  Domai-n |
| How it is administered | Interview | Interview | interview | interview | interview | Numeracy Interview | numeracy Interview | Interview | Intervi-ew |
| Estimated time | 3-5 minutes | 1-2 minutes | 2-3 minutes | 3-6 minutes | 3-5 minutes | Up to 22 minutes | Less than  10 minutes | Not stated | Average 2.9 minutes |
| Scoring | 0-125 | 0-66 | 0-66 | 0-50 | 0-42 | Combined weighted  score 0-100 | Combined weighted  score 0-100 | Combined score  from 0-12 | Single  score  0-6 |
|  |

Adopted from Jordan et al.( 2011).Critical Appraisal of Health Literacy Indices Revealed Variable underlying Constructs, Narrow Content and Psychometric Weakness.

**Appendix B**

**The Newest Vital Sign**



READ TO SUBJECT:  
This information is on the back of a container of a pint of ice cream.

1. If you eat the entire container, how many calories will you eat?

Answer: 1,000 is the only correct answer

1. If you are allowed to eat 60 grams of carbohydrates as a snack, how much ice cream could you have?  
   Answer: Any of the following is correct: 1 cup (or any amount up to 1 cup), half the container. Note: If patient answers “two servings,” ask “How much ice cream would that be if you were to measure it into a bowl?”
2. Your doctor advises you to reduce the amount of saturated fat in your diet.  
   You usually have 42 g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?  
   Answer: 33 is the only correct answer
3. If you usually eat 2,500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?  
   Answer: 10% is the only correct answer
4. Is it safe for you to eat this ice cream?
5. (Ask only if the patient responds “no” to question 5): Why not?

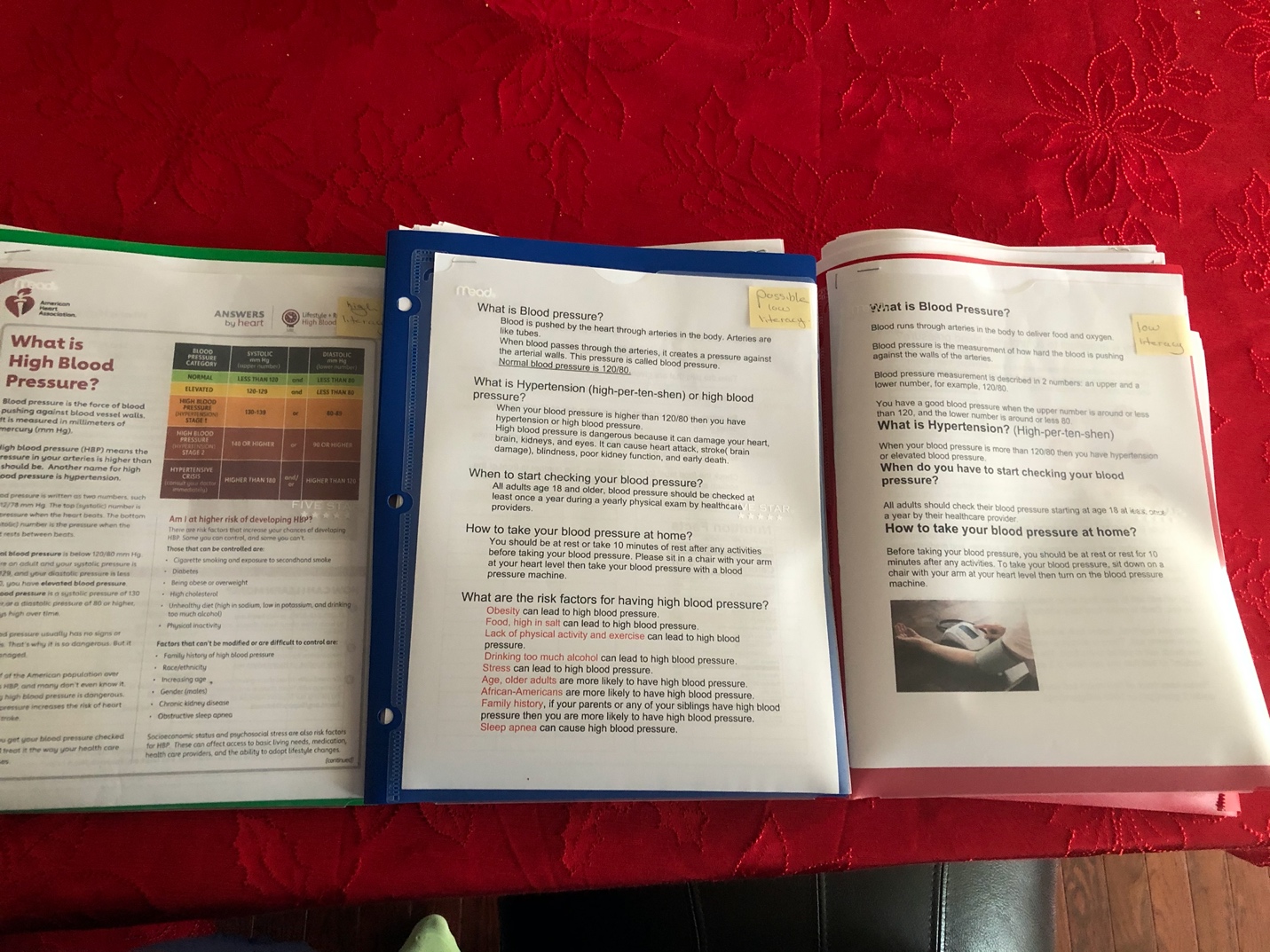
Answer: Because it has peanut oil.

Score of 0-1 suggests high likelihood (50% or more) of limited literacy. Score of 2-3 indicates the possibility of limited literacy.  
Score of 4-6 almost always indicates adequate literacy.

Adapted from www.Pfizer.com

**Appendix C**

**Color Coded Education Handouts**



Picture of 3 Literacy Level Folders provided to the MHC Clinic (Red with low literacy, blue with at risk literacy, and green with adequate literacy handouts).

**Appendix D (The first page of low-literacy level handout)**

**What is Blood Pressure?**

Blood runs through arteries in the body to deliver food and oxygen.

Blood pressure is the measurement of how hard the blood is pushing against the walls of the arteries.

Blood pressure measurement is described in 2 numbers: an upper and a lower number, for example, 120/80.

You have a good blood pressure when the upper number is around or less than 120, and the lower number is around or less 80.

**What is Hypertension?** (High-per-ten-shen)

When your blood pressure is more than 120/80 then you have hypertension or elevated blood pressure.

**When do you have to start checking your blood pressure?**

All adults should check their blood pressure starting at age 18 at least once a year by their healthcare provider.

**How to take your blood pressure at home?**

Before taking your blood pressure, you should be at rest or rest for 10 minutes after any activities. To take your blood pressure, sit down on a chair with your arm at your heart level then turn on the blood pressure machine.



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