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Assessing the Health Literacy Levels of Diabetic Patients Located in Rural Southeast Kansas

Meghan Murray
Pittsburg State University, meghan.murray@gus.pittstate.edu

ASSESSING THE HEALTH LITERACY LEVELS OF DIABETIC PATIENTS LOCATED IN RURAL SOUTHEAST KANSAS

A Scholarly Project Submitted to the Graduate School in Partial Fulfillment of the Requirements for the Degree of Doctor of Nursing Practice

Meghan Kathleen Murray

Pittsburg State University

Pittsburg, Kansas

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An Abstract of the Scholarly Project by
Meghan Kathleen Murray

Data shows that limited health literacy is prevalent throughout the United States. This data has also found a correlative relationship between limited health literacy and poor health outcomes. An individual's health literacy level affects many areas of their health, including their ability to effectively manage chronic diseases, such as diabetes mellitus. Awareness of an individual's health literacy level allows for targeted interventions and a potential improvement for a patient's health outcomes. The Newest Vital Sign (NVS) is a validated screening tool that allows for the identification of a patient's likely health literacy level. The purpose of this Doctor of Nursing scholarly project was to identify the health literacy levels of pre, type one or type two diabetic patients attending the Diabetes Self-Management Education (DSME) classes led by the certified diabetic educator (CDE) of the Community Health Center of Southeast Kansas (CHCSEK) clinics, through the utilization of the NVS screening tool. The surveyed population included diabetic individuals aged 18 and over who attended group DSME classes in December of 2020 at one rurally located CHCSEK clinic. Due to sample size, the project results were not statistically significant; however, it was concluded that there remains a continued need for health literacy level identification and diabetic education within the rurally located Southeast Kansas clinic community.

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CHAPTER I

INTRODUCTION

Health literacy, as outlined by the Centers for Disease Control and Prevention [CDC] (2021), is an individual's multifaced ability to utilize health information in order to best care for themselves, their family, and their community. According to the National Library of Medicine [NLOM] (2015) health literacy is considered a "robust demographic predictor of health outcomes" which echoes the positive correlation found between low health literacy and poor health outcomes (para 1). The focus of this chapter is to discuss the prevalence of limited health literacy levels, particularly in patients diagnosed with diabetes mellitus, as well as to focus on the need for health literacy level assessments. The overall goal of the project focuses on identifying diabetic individuals, residing in rural Southeast Kansas (SEK), who are at risk for poor health outcomes related to limited health literacy levels.

Description of the Clinical Problem

The link between low health literacy and poor health outcomes has been fully established (Eadie, 2014). Low levels of health literacy have also previously been identified as being significantly prevalent throughout all of the United States (Yin et al., 2009). Additionally, low or limited health literacy found in diabetic patients poses a significant barrier in regard to chronic disease self-management (Kim & Lee, 2016).

Overall, individuals with low health literacy are less likely to understand health information, have a decreased life expectancy and are at risk for hospital admission and frequent readmission (Dickens et al., 2013). Therefore, the awareness of an individual's health literacy level is "integral to patient care, safety, education and counseling" (Dickens et al., 2013, p. 62). A complete understanding of health literacy, the prevalence of diabetes mellitus, and the need for health literacy assessment in diabetic patients is essential to achieving this goal.

Health Literacy

Health literacy is an important component that must be understood in order to determine the impact it has on health outcomes within healthcare as a whole. To understand health literacy, it is necessary to comprehend the term *literacy*. Health literacy is a more focused component of the broader noun, *literacy*. Today, a literate individual, defined by Merriam-Webster (2021), is an "educated person" and/or "a person who can read and write" (para 1). Health literacy was initially difficult to define due to the application of skills and knowledge that are required to be deemed "literate in relation to one's health" (Berkman et al., 2010, p. 12). However, the increased attention surrounding literacy, coupled with trends that documented the relationship between "low literacy, health status and health outcomes" fundamentally led to the development of the term health literacy (Berkman et al., 2010, p. 12). As defined by the CDC (2021), personal health literacy is now known as "the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others" (para 2).

Fernandez et al. (2016) studied the impact of low health literacy in individuals and its role as a powerful predictor of poor health outcomes. Overall, limited health literacy has been linked to "greater use of emergency services, higher rates of hospitalization, and higher rates of mortality" as well as "less use of preventive services, and poorer adherence to medication regimens" (Fernandez et al., 2016, p. 2). Furthermore, according to Letourneau et al. (2015), limited health literacy has also been linked to "poor self-reported health, an inability to understand written health information, reduced health care system access, increased chronic disease incidence, poor chronic disease management and smoking" (p. 246).

The first and most recently conducted National Assessment of Adult Literacy (NAAL) in 2003 found that only 12% of adults in the United States have "proficient" health literacy (the highest of the four distinct tiers) and over one third of adults in the United States have basic or below basic health literacy (the two lowest tiers), (U.S. Department of Health & Human Services [HHS], 2008, para 4). This equates to over 80 million adults in the United States having limited health literacy (Kutner, et al., 2006). The NAAL was the first study to "evaluate health literacy in the American population with the intent to measure the ability to read, understand and apply health-related information" (Cutilli & Bennett, 2009, p. 28). It did this by ensuring that each individual's prose, document, and quantitative literacy were assessed (Cutilli & Bennett, 2009).

Additionally, low health literacy levels were found to be present in individuals across multiple ethnic groups, education levels, and socioeconomic statuses, independent of their health insurance status (HHS, 2008). Not only has low health literacy been

identified across varying patient populations, despite personal demographics, it has also been extensively linked to overall poor health outcomes (Eadie, 2014). These factors, including the addition of an individual's age, are considered contributing components to low health literacy levels (Chessar et al., 2016). Overall, working to improve health literacy is relevant to all individuals regardless of their personal background or demographics.

The need to improve the health outcomes of individuals with poor health literacy levels is crucial. According to Ingram & Kautz (2018) health literacy has been labeled as a "silent epidemic" (p. 132). Letourneau et al. (2015) states that working towards improving and advocating for increased literacy and health literacy is being seen as a "population health strategy" (p. 246). Many organizations are now taking part in focused efforts to assess, measure and identify health literacy deficits with the hopes of improving and removing health literacy barriers within the communities they serve (CDC, 2021).

Prevalence of Diabetes Mellitus

The most recent survey, conducted in 2018, found 34.2 million Americans to have diabetes mellitus and 88 million to be prediabetic (American Diabetes Association [ADA], 2021). Each year, it is estimated that an additional 1.5 million individuals will be diagnosed with the disease (ADA, 2021). Even further, the National Diabetes Statistic Report, submitted jointly by the U.S. Department of Health and Human Services and the CDC (2020) reports that the trend of undiagnosed and diagnosed diabetes continues to rise substantially each year. Currently, diabetes is the seventh leading cause of death in the United Sates (ADA, 2021). Not only this, but many diabetic patients are also

diagnosed with multiple comorbidities that may lead them to further complications, resulting in increased costs to themselves and the healthcare system (Struijs et al., 2006).

According to the Agency for Healthcare Research and Quality [AHRQ] (2014), diabetes is one of the top three medical conditions identified in Medicare patients who have the largest 30-day readmission rates, along with those with mood disorders and schizophrenia. In total, 23,700 readmissions were attributed to diabetic patients alone, each year, in the United States (AHRQ, 2014). The cost for readmission, attributed to all three conditions, was a yearly total of $839 million (AHRQ, 2014). According to the ADA (2021), the total cost of diabetes, unrelated to readmission rates in 2018, was $327 billion. Fernandez et al. (2016) reports low health literacy levels in individuals with chronic diseases, such as diabetes, are likely potential attributers to the identified hospital admission and readmission rates that are costly to both the patient and the healthcare system. Overall, the diabetic population is widespread and is at an increased risk for many different adverse health and expense related outcomes (ADA, 2021).

Need for Health Literacy Assessment

According to Kirkner (2018), not only is health literacy prevalent today, but those with low health literacy scores are "50% more likely to return to the hospital within 30 days of discharge" (para 1). Due to this, it is recommended that hospitals and outpatient services begin to screen patients to identify those who are at a higher risk for admission and/or readmission (LaPointe, 2018). There are many different screening tools available to assess health literacy (Bailey et al., 2014). Such screening tools include the Rapid Estimate of Adult Literacy in Medicine (REALM), the Test of Functional Health Literacy in Adults (TOFHLA), the Newest Vital Sign (NVS), the eHealth Literacy Scale

(eHEALS), the Health Literacy Questionnaire (HLQ), and more (NLOM, 2015). Each screening tool comes with pros and cons in relation to its use and ability to accurately identify health literacy deficits (NLOM, 2015).

Over the years, improvements, and meaningful advancements in regard to diabetes and valid health literacy measurements have been made (Bailey et al., 2014). Studies have found that literacy and numeracy (components of health literacy) are often the key areas associated with self-care and glycemic control in diabetic patients specifically (Bailey et al., 2014). Bailey et al. (2014) continued to emphasize the statistically significant relationship found between individuals with higher health literacy having "greater diabetes-specific knowledge" (p. 590).

If patients with limited health literacy are identified in a timely manner, proper interventions can be made in order to decrease the incidence of poor health outcomes that have been frequently associated with limited health literacy levels. In summary, the previously discussed prevalence of low health literacy and its effect on patient health, coupled with the ever-increasing number of individuals diagnosed with diabetes mellitus lead to the development of the research problem.

Significance

This topic is significantly important to the nursing profession as bedside nurses and advanced practitioners will likely come into contact with individuals with low health literacy frequently in their line of care. Additionally, it has been found that nurses, among other healthcare providers, may often overestimate a patient's health literacy level, potentially causing a lack of follow through for patients who may need extra supervision and support (Dickens et al., 2013). Educating patients and working towards efficient

communication are “core elements of the nursing profession” thus, the importance of understanding the prevalence of low health literacy and its potential effect on a patient and their plan of care is essential (Dickens et al., 2013, p. 62).

As healthcare providers and practitioners, caring for an individual holistically includes assessing for health literacy deficits. This must be done in order to increase a patient’s knowledge and overall health, as low health literacy levels have continued to correlate statistically with poor health outcomes (Letourneau et al., 2015). As previously mentioned, there are many screening tools available that can be utilized to assess for health literacy deficits, with the most commonly used being the TOFHLA and REALM screening tools (Fernandez et al., 2016). However, one of one of the newer health literacy screening tools, the NVS, allowed for nursing staff to administer the tool quickly (over approximately three minutes) while still providing an effective measure of an individual’s health literacy level (Ylitalo, 2018). This can be viewed as a considerable improvement when compared to the previously developed health literacy screening tools that often take a more substantial amount of time to administer (Fernandez et al., 2016). Overall, the assessment of a patient’s health literacy level offers providers the ability to acknowledge where individuals may be lacking and work to address their identified deficits (Ylitalo, 2018).

The nursing profession must remain vigilant in recognizing and allowing for intervention in patients who demonstrate limited health literacy levels. For in order to truly improve the health outcomes of all patients, focus must remain on education, improving health literacy and continuing to be proactive within healthcare as a whole.

Purpose

The purpose of this Doctor of Nursing Practice (DNP) scholarly project was to assess the health literacy levels of prediabetic, type one diabetic or type two diabetic patients participating in Diabetes Self-Management Education (DSME) classes led by the certified diabetic educator (CDE) of the Community Health Center of Southeast Kansas (CHCSEK) through the utilization of the NVS screening tool. Secondary goals included establishing the demographics of each participant and determining if there was a continued need for health literacy level assessment and continued diabetic education within the rural SEK diabetic community, as well as whether or not the addition of the NVS to the DSME classes would be beneficial.

Theoretical Framework

The Interaction Model of Client Health Behavior was developed by Cheryl Cox in 1982. Cox's (1982) framework (Figure 1) illustrates the relationship and process that patients and providers are subject to during their interactions and how that association can positively influence a patient's health outcome. The purpose of her theory was to create a client-focused framework in which health care professionals are purposely placed in a position where they are capable of improving a patient's overall health (Cox, 1982).

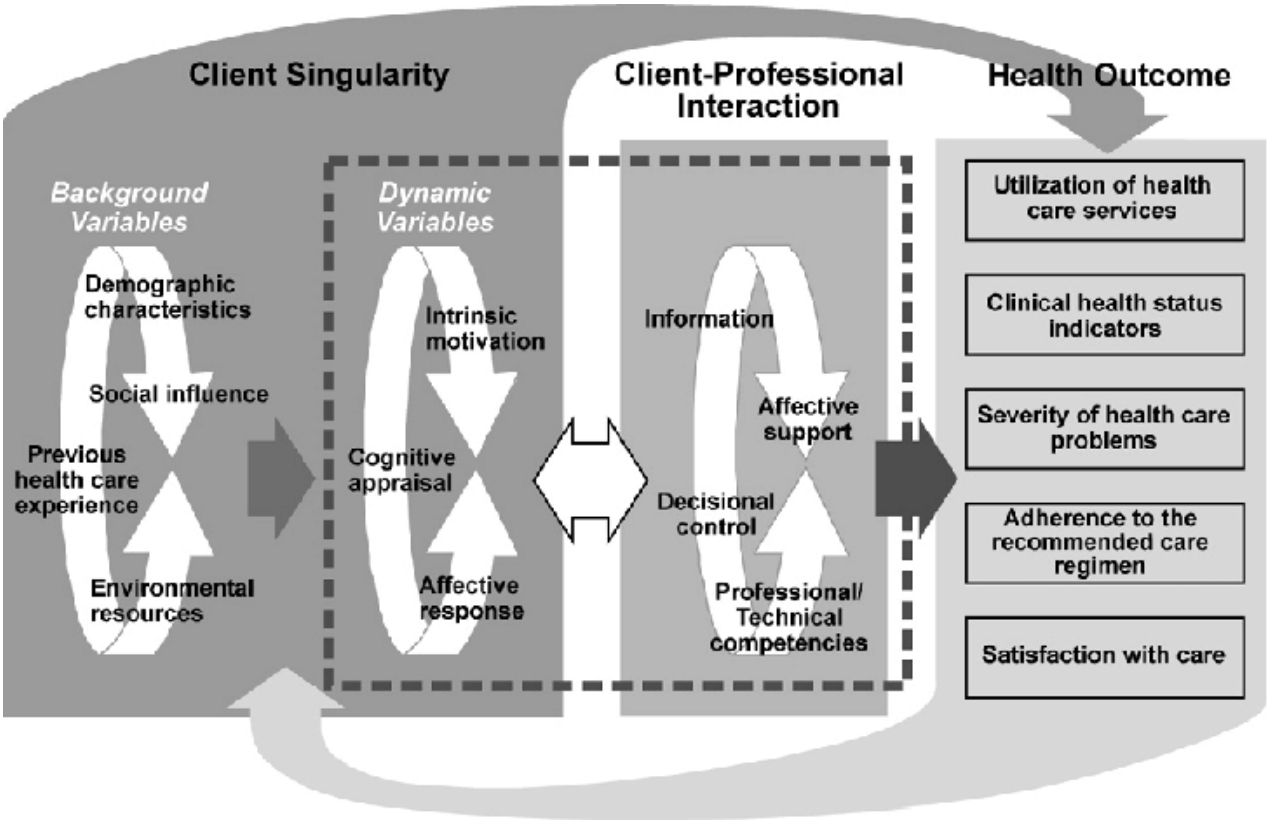
This theory is configured of three main concepts: client singularity, client-professional interaction, and health outcomes (Cox, 1982). Each variable is subject to influencing a client's health outcome based on their personal attributes and the interaction they have with a healthcare professional. These concepts were clearly linked to the key variables of the scholarly project in question. For example, the first concept, client

singularity, includes a patient's demographics, along with their potential social influence, environmental resources, and motivation, all of which can affect a patient's health literacy level (Cox, 1982). The second concept, the client-professional interaction, includes providing information and assessing professional and technical competencies, which was demonstrated through the assessment of each patient's health literacy level and by providing information related to diabetes during the DSME classes. The third and final concept, health outcomes, includes the summation of the two previous concepts and how those actions can lead to better health outcomes for patients, including better use of health care services and increased patient satisfaction with care. This framework would also be very beneficial to a future research project that focused on implementing specific interventions and health literacy improvement strategies after health literacy deficits were noted within a population, as the client-professional interaction and the improved health outcomes would have a larger and more in-depth focus in this regard.

Overall, Cox's (1982) framework was applied and utilized specifically by determining a patient's health literacy level and using that data as evidence for the need to provide support, education, and additional competencies for patients. The push for additional support for those with identified health literacy deficits has been shown to allow for a greater adherence to care regimens, decrease the severity of health care problems and more. All of the afore mentioned aspects correlate with improvement in patient health outcomes and are the main focus within the final component of Cox's framework (1982).

Figure 1

The interaction model of client health behavior.



Note. Reprinted from "An Interaction Model of Client Health Behavior: Theoretical Prescription for Nursing," by C. Cox, 1982, *Advances in Nursing Science, 5*(1), 41-56. Copyright [1982] by Aspen Systems Corporation.

Project Questions

In total, four project questions were established in order to fully evaluate the DNP scholarly project and its focus on health literacy level identification in the diabetic population of rural SEK. Each question is listed separately below.

1. Utilizing the Newest Vital Sign (NVS), what are the estimated health literacy levels of diabetic patients attending Diabetes Self-management Education (DSME) classes at the Community Health Center of Southeast Kansas (CHCSEK) clinic locations?

2. What are the demographics regarding age, gender, race/ethnicity, diabetes mellitus type (prediabetic, type one diabetic, type two diabetic), education and insurance status of the diabetic patients attending DSME classes at the CHCSEK clinic locations?
3. Do the identified health literacy levels of diabetic patients attending DSME classes at the CHCSEK clinic locations suggest support for the need of continued diabetic education, as a whole, moving forward?
4. Will adding the NVS to the DSME classes at the CHCSEK clinic locations increase the awareness and knowledge regarding the health literacy levels and the educational needs of the diabetic patients in attendance?

Definition of Key Variables

Key variables within the DNP scholarly project included the certified diabetic educator, diabetic patients, health literacy, the Newest Vital Sign (NVS), and rural location. Each variable played an important role in the scholarly project.

- **Certified Diabetic Educator**: a registered nurse who "specializes in educating, supporting, and promoting self-management of diabetes" (A. Massey, 2019, para 1). The CHCSEK diabetic educator had been previously certified by the Certification Board for Diabetes Care and Education and was in charge of the DSME classes held at the various CHCSEK clinic locations.
- **Diabetic Patients**: any patient attending the group DSME classes at the CHCSEK who had been previously diagnosed with either prediabetes mellitus, diabetes mellitus type one or diabetes mellitus type two.

- **Health Literacy**: the "degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others" (CDC, 2021, para 2). For the purpose of the project, health literacy was assessed utilizing the NVS during the DSME classes held by the CHCSEK.
- **Newest Vital Sign**: a standardized health literacy assessment screening tool, comprised of six questions, that can be administered in approximately three minutes (Pfizer, 2011). The NVS was established to assess a patient's prose, numeracy, and document literacy (Pfizer, 2011). These components are part of the multifaceted definition of health literacy and are necessary in order to comprehend and use healthcare instructions; understand medication dosages, frequency, and route; and to recognize important parameters, such as when a glucose level is too high (Pfizer, 2011). The scoring system for the NVS places participants into one of three different categories: high likelihood of limited health literacy, possibility of limited health literacy, and adequate health literacy (Pfizer, 2011).
- **Rural Location**: those populations, housing, or territories not in an urban area, with urban areas defined as a population of 50,000 or more with clusters of at least 2,500 (U.S. Department of Agriculture, 2019).

Logic Model

The developed logic model (Figure 2) visually illustrates the link between the inputs, activities, and the outcomes of the DNP scholarly project. The diagram displays the initial phase of the project which included building relationships with key

stakeholders (to specifically include the diabetic educator of the CHCSEK) as well as time spent ensuring adequate knowledge and training regarding administration of the NVS and its attached demographic survey. To fully evaluate the health literacy levels of rurally located diabetic patients, the NVS screening tool was administered to the prediabetic, type one or type two diabetic patients who attended the DSME classes offered through the CHCSEK. An open-ended questionnaire, following data collection, was administered to the diabetic educator in order to allow for a greater interpretation of the results of the project. The expected outcomes included increased provider knowledge of each patient's health literacy level and their demographic profile, as well as a greater awareness of their potential health needs. Further details regarding inputs, activities and outcomes are represented within the logic model below.

Figure 2

Logic Model.

Logic Model

Purpose: To identify the health literacy level of diabetic patients attending DSME classes at the rurally located CHCSEK clinic locations, utilizing the Newest Vital Sign health literacy assessment tool.

INPUTS	ACTIVITIES		OUTCOMES		
What we invest	What we do	Who we reach	Short-term results	Intermediate results	Long-term results
• Trained and experienced Registered Nurses (RN) • Strong relationships with stakeholders • Awareness of existing resources • Newest Vital Sign (NVS) Template • Training and practice facilitation • Doctor of Nursing Practice Student	• Assess readiness of health system • Conduct meetings and interviews with the Diabetic Educator of CHCSEK at the Pittsburg, KS location • Develop & establish roles • Utilize the NVS during the DSME classes • Identify the estimated health literacy (HL) levels of each diabetic (DM) patient present	• Pre diabetic, type one, and type two diabetic patients regardless of identified HL level	• Increased communication between patient and health care team • Increase patient understanding • Increased provider understanding of patient needs • Increased awareness and acute knowledge of the health literacy levels of DM patients in rural SEK	• Continued and/or increased DSME classes	• Increased and improved health literacy in DM patients • Focus on improvement in health outcomes of DM patients • Continued awareness of the HL level of DM patients in rural CHCSEK • Basis for further research and data collection

Context: A rurally located and federally qualified health center who has been given Federal Public Health Service (PHS) status, with multiple clinics located throughout rural Southeast Kansas.

Summary

The consistent relationship exhibited between low health literacy and poor patient health outcomes should be of concern to healthcare providers, especially those serving rural communities, such as the afore-mentioned SEK region. Rurally located communities are often adversely impacted when it comes to health outcomes within their population (Romine & Horton, 2020). Additionally, research has shown that health literacy levels can be used as a potential indicator for an individual's future health outcome (NLOM, 2015). The rise in percentage of individuals diagnosed with diabetes mellitus each year is also of concern (ADA, 2021). Individuals with low health literacy who are also diagnosed with chronic diseases, such as diabetes mellitus, are consequently at an increased risk for exhibiting poor health outcomes related to their ability or inability to self-manage their disease and navigate the healthcare system (Kim & Lee, 2016).

Overall, health literacy identification and intervention, with the goal of improving the health and health outcomes of each assessed individual, could be applied to many different areas of healthcare. However, the goal of this scholarly project was to specifically work to identify health literacy deficits in rurally located diabetic patients, to potentially allow for the support and evidence needed to encourage patient education and routine health literacy level assessment.

CHAPTER II

INTEGRATED REVIEW OF THE LITERATURE

A review of the literature was completed by utilizing several research databases available through Pittsburg State University's library services, including the Cumulative Index of Nursing and Allied Health Literature (CINAHL) Plus with Full Text, PubMed, PubMed Central and MEDLINE Plus Health Information. Several government-mandated websites were also utilized including the Centers for Disease Control and Intervention (CDC), the U.S. Department of Health and Human Services (HHS), the American Diabetes Association (ADA) and Healthy People 2020. A combination of terms was used to search each database including, "literacy," "health literacy," "health outcomes," "healthy literacy and health outcomes", "diabetes", "diabetes and health literacy", "diabetes and health outcomes," "health literacy and rurality," "rural SEK report," "measuring health literacy," "health literacy improvement strategies," and "health literacy interventions." Initially, specific search parameters included research conducted within the last five years, medical journals with access to full text, and specific research styles including randomized control trials, systematic reviews, meta-analysis, clinical trials, and qualitative studies. The timeframe date range had to be adjusted to include articles over five years old due to lack of an adequate number of recent research when specifically looking at certain aspects of the review, including the results of the National

Assessment of Adult Literacy (NAAL) which was conducted (and has not since been repeated) in 2003, as well as some of the original studies that initially documented the history and growth of literacy and health literacy over time. After a review of each article for relevance, a total of 37 articles were used and referenced within the literature review.

Health Literacy

Multiple themes were noted throughout the literature review, allowing for nine different sections to be addressed below. These sections will provide information about the description and significance of health literacy, the importance of health literacy identification, the relationship between health literacy and patient health, health literacy in the rurally located, health outcome strategies, health literacy and chronic disease management, and health literacy practice change guidelines.

Description of Phenomenon

Health literacy is a focused component of the noun, *literacy*. According to Gee (2013), literacy has had numerous definitions that have developed and advanced over time. In the 1800s, an individual was deemed literate if they were able to use a signature on a legal document versus initialing it with an X (Berkman et al., 2010). Today, a person is considered literate if they are an educated person who is able to read and write (Merriam-Webster, 2021). In 1996, the Literacy Task Force was established in order to identify and improve literacy with the goal of progressing "the economy as a whole" (Gee, 2013, p. 6). The concept of health literacy was not fully introduced into literature until the 1990s (Cutilli & Bennett, 2009). After that time, there began to be more discussion regarding the idea of health literacy, how to define it, it's overall importance to healthcare, and how to essentially consider someone "literate in relation to one's

health" (Berkman et al., 2010, p. 12). Attention also started to shift around the profound relationship found between health literacy and health outcomes, which essentially led to the development of the present-day term, health literacy (Berkman et al., 2010).

Healthy People 2010 and Healthy People 2020 had previously defined health literacy as the "degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (CDC, 2021, para 4). However, in 2020, the definition of health literacy was updated for Healthy People 2030, and is now divided into two separate categories: personal health literacy and organizational health literacy (CDC, 2021). Personal health literacy is explicitly defined as "the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others" (para 2). While organizational health literacy is "the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others" (CDC, 2021, para 3). The afore-mentioned definitions were updated in order to emphasize the ability of individuals to not only understand health information, but to use it (CDC, 2021). Additionally, the definitions now focus on incorporating public health and adding organizational responsibility in regard to addressing health literacy within the community (CDC, 2021).

Significance of Health Literacy

There have been many studies conducted that have looked at the relationship between health literacy and patient health outcomes (Fernandez et al., 2016). These studies revealed a statistically significant correlation between low health literacy and

poor health outcomes (Fernandez et al., 2016). The CDC (2019c) provides several research articles with data that demonstrate the correlation between limited health literacy and its negative effect on different "health conditions, diseases, situations, and outcomes, including health status and costs" (para 9). More specifically, limited or low health literacy has been linked to higher rates of obesity, smoking, increased mortality and morbidity, increased costs to the healthcare system, inability for self-efficacy in regard to disease management, less use of preventive services, and more (Letourneau et al., 2015).

Since the first national health literacy assessment conducted in 2003, which showed only 12% of American adults having "proficient" health literacy, there has been an increased drive and focus on identifying and improving health literacy in the United States (HHS, 2008, para 4). Proficient health literacy is the highest of the four predetermined literacy levels established by the U.S. Department of Education to be used for the scoring of the previously conducted NAAL (Kutner et al., 2006). The four different designations within the health literacy scale included below basic, basic, intermediate, and proficient, each of which incorporated prose, document, and quantitative measurements in order to effectively measure health literacy (Kutner, 2006). Depending on the score of each prose, document, and quantitative scale the participant was placed in one of the four health literacy levels listed above (Kutner, 2006). Appendix A summarizes the needed capabilities to be scored into the below basic, basic, intermediate, or proficient health literacy categories. Since 2003, although there have been no further national assessment surveys, data still suggests that 9 out of 10 adults "struggle to understand and use health information" (CDC, 2019b, para 3).

Health Literacy Screening Instruments

Studies noted within the literature, mainly quantitative in nature, have recognized the need for health literacy level identification. In order to improve the identification process, screening tools were created to measure health literacy levels (Fernandez et al., 2016). Three tests used consistently over the years include the Rapid Estimate of Adult Literacy in Medicine (REALM), the Test of Functional Health Literacy in Adults (TOFHLA), and the Health Literacy Skills Instrument (HLSI), (P. Massey et al., 2013). The REALM and TOFHLA health literacy screening tools identify reading comprehension and health related word recognition (P. Massey et al., 2013). These two tools were initially deemed the "gold standards" when it came to measuring health literacy (Ylitalo et al., 2018). However, they do not allow for the measurement of the "construct of health literacy" (P. Massey et al., 2013, p. 342). They may also be culturally insensitive (Ylitalo et al., 2018). The third commonly used screening tool is the HLSI, which is able to assess individuals by using specific health scenarios that allow for a more comprehensive view of their health literacy level (P. Massey et al., 2013). Other screening tools that have been developed and used include the eHealth Literacy scale (eHEALS) and the Health Literacy Questionnaire (HLQ). Both of these scales have the ability to "conceptualize cultural and conceptual knowledge, speaking and listening skills, writing and reading skills, and numeracy"; however, their extensive length has caused issues with ease of use and the practicality of their administration (Ylitalo et al., 2018, p. 2).

One sole standardized screening tool for individual and/or specific age groups does not exist (P. Massey et al., 2013) Instead, health professionals must choose from

several health literacy screening tools, each with their own list of strengths and weaknesses (National Library of Medicine [NLOM], 2015). A majority of the existing screening tools are intended for the adult population; however, there are some that have been adapted for the adolescent age group, such as the screening tool titled Rapid Estimate of Adult Literacy in Medicine-Teen (REALM-Teen), (Caldwell et al., 2018). Disease-specific health literacy tools have also been created, including health literacy screenings for those diagnosed with diabetes mellitus, cardiovascular disease, kidney disease, and more (Boston University, 2021). Overall, these screening tools aim to test an individual's ability to understand patient-specific instructions and competencies, with some being more in depth, and more patient specific, than others.

To build upon the previously used screening methods, a short and reliable tool called the Newest Vital Sign (NVS) was developed by Weiss et al. in 2005. This was done in order to assess an individual's ability to "apply health information to health-related decisions" while hopefully improving on some limitations that were noted within the previously developed screening tools (P. Massey et al., 2013, p. 343). Some targeted limitations included previous screening tools being too long for routine use or only being available in English (Weiss et al., 2005). Thus, the NVS was intended to be used as a quick and efficient way to accurately obtain a patient's health literacy level (Weiss et al., 2005). It does this by measuring an individual's prose, document, and quantitative literacy (Pfizer, 2011). During its development, the NVS was validated by using the TOFHLA screening tool as its "reference standard" (Weiss et al., 2005, para 4). Results of the study showed reliability at >0.88 in English and >0.72 in Spanish (Weiss et al., 2005). Additionally, Boston University (2021) reports concurrent criterion validity via

the TOFHLA screening tool, as evidenced by r=0.56. Further measure analysis included 100% sensitivity and 64% specificity reports (Boston University, 2021). According to Ylitalo et al. (2018) the NVS has since been used frequently within the clinical setting and has demonstrated a "high sensitivity to detect limited health literacy" (p. 2). For further support, the NLOM (2015) also indicated that the NVS showed reliability in both English and Spanish when using the TOFHLA screening tool for correlation. Kordovski et al. (2017) also found the NVS reliable through correlation with the REALM screening tool while studying health literacy in patients diagnosed with Human Immunodeficiency Virus (HIV). More specifically, its data found reliability with evidence for convergent validity and incremental criterion-related validity (Kordovski et al., 2017). By 2013, the NVS had already been utilized and published in more than 50 peer-reviewed journals (Rowlands et al., 2013).

Overall, the NVS tool is useful and appealing to clinical practice because it has been validated, it can be completed shortly (in approximately three minutes) and is available in various languages and countries including the United States, the United Kingdom, Japan, the Netherlands, Kuwait, Italy, Brazil, China and more (Rowlands et al., 2013).

The Pfizer corporation developed the "NVS Toolkit" as a part of their Clear Health Communication Initiative, with the goal of transitioning to routine use of the NVS in order to assess health literacy levels on a wider scale (Pfizer, 2011). With implementation, the newfound information regarding the health literacy level of each identified patient, providers and other healthcare team members were able to adjust their communication styles and provide the proper education to patients to ensure their full

understanding at their appointment or prior to their discharge from the hospital (Pfizer, 2011).

In more detail, the tool itself consists of six questions referring to an ice cream nutrition label given to the patient (Pfizer, 2011). Using a nutrition label allows for the evaluation of prose, numeracy, and document literacy, all of which comprise health literacy (Pfizer, 2011). For example, prose literacy is assessed by asking the patient to read the label and determine if they would be able to eat the ice cream if they were allergic to peanuts (Pfizer, 2011). Numeracy is assessed by asking the patient to calculate the number of calories in one serving of ice cream (Pfizer, 2011). Document literacy is assessed by asking the patient to recognize the amount of saturated fat in one serving and to understand how this will affect the participant's daily dietary intake if they choose not to eat it (Pfizer, 2011). The incorporation of each carefully selected question allows for the NVS to assess a patient's likely health literacy level fully and efficiently.

Overall, multiple screening tools remain available for health professionals to utilize in practice in order to identify health literacy deficits within their patient population (Fernandez, 2016). More specifically, the ease of use, validated results, and short administration time lead the NVS to currently be in the forefront of data collection (Karl & McDaniel, 2018).

Identifying Health Literacy Deficits

Most health literacy research studies reviewed took a targeted population (varying ages, educational levels, disease processes and socioeconomic statuses) and tested their health literacy levels by using the afore-mentioned standardized health literacy assessment tools. These studies attempted to identify health literacy deficits in a specific

population or category of individuals. A study completed by the HHS (2008) tested adults in the United States that showed low health literacy level scores ranking higher in the undereducated, lower income, and often non-Caucasian and uninsured population.

A cross sectional study developed and completed by Bodur et al. (2017) assessed adult individuals using the NVS and the Health Literacy Questionnaire (HLQ). Bodur et al. (2017) noted that during a review of the literature they conducted in preparation for their study, sources were found affirming that education is the strongest factor affecting health literacy, as well as data that linked health literacy levels to demographics and "socio-economic factors in various studies" (p. 107). Bodur et al. (2017) utilized backward logistic regression to determine the relationship between a participant's health literacy level and the numerous demographic variables measured such as income status, profession, education, and age. The results of their study found that health literacy levels were positively associated with education and income status based on a p value <0.05 (Bodur et al., 2017). Furthermore, Bodur et al. (2017) addressed how health outcomes can be improved by increasing the awareness and understanding of health literacy in all individuals. A study by Bourne et al. (2018) indicated results consistent with previously reviewed literature suggesting that low health literacy levels correlate with "employment status, household income, low physical activity levels, smoking, internet use and speaking a language other than English" (p. 6).

Despite consistent findings, a synthesis of the literature showed that although health literacy is most likely higher in certain populations, patient demographics are not necessarily an accurate tool to determine a patient's health literacy level. For example, in an observational, cross-sectional study conducted by Karl & McDaniel (2018), health

literacy was tested using the NVS on 120 university employees all of which were deemed to be “educated” (p. 419). The results of this study showed that older individuals and non-English participants did result in lower NVS scores; however, there was no statistical significance, based on a p value <0.01, noted between low health literacy scores and an individual’s educational background (Karl & McDaniel, 2018). Karl & McDaniel (2018) also noted that “health professionals generally overestimate clients’ health literacy levels”; therefore, the importance of screening an individual versus grouping them in a health literacy category based on their demographics was reiterated (p. 419). The disadvantages to this study included its small sample size which may have affected its reliability.

Overall, a majority of the literature does show a statistically significant correlation between an individual’s demographics, including their education level, and the result of their health literacy score (Bodur et al., 2017).

Health Literacy and Patient Health

As health literacy levels are identified, it remains imperative that healthcare professionals continue to look at the relationship that low health literacy levels may have with an individual and their health status. As previously mentioned, studies have shown that individuals with low health literacy are more likely to exhibit poor health choices and have increased rates of mortality (Fernandez et al., 2016). According to Nutbeam (2015), health behaviors affected by low health literacy levels include, but are not limited to, tobacco and alcohol use, poor food and hygiene practices, and lack of medicine use.

Fernandez et al. (2016) completed a secondary analysis attempting to determine associations between health literacy in older adults and preventive health behaviors. This

study used the TOFHLA screening tool to measure an individual's health literacy level and cross analyzed the result to their self-reported likelihood of participating in preventive health measures (Fernandez et al., 2016). The results of the study demonstrated a relationship between high literacy scores and an increased likelihood of reporting preventive service use, increased physical activity and less tobacco use based on a p value ranging from $p < 0.003$ to $p < 0.024$ for each specific variable tested (Fernandez et al., 2016, p. 8).

Individuals who demonstrate low health literacy are more likely to use emergency services and less likely to practice preventive health behaviors, thus adding to the overall cost of healthcare (Fernandez et al., 2016). According to Karl & McDaniel (2018), the cost of low health literacy levels in the United States is "between 106 billion and 236 billion" US dollars (p. 419). With this, studies are now suggesting that an individual's health literacy level is a stronger predictor of their overall health versus other potential indicators and demographics (Karl & McDaniel, 2018). Even further, the World Health Organization [WHO] (2013) previously labeled health literacy as a "key determinant of health" and reiterates that health literacy remains a "stronger predictor of an individual's health status than income, employment status, education level and racial or ethnic group" (p. 7).

Individuals can also face situational health literacy in that when faced with an emotional or uncomfortable situation they may temporarily exhibit a low health literacy level (Nutbeam, 2015). More specifically, they may have challenges when they or their family are ill, causing them to regress in terms of their health literacy level, which could potentially affect their personal and/or family's overall health (Karl & McDaniel, 2018).

In summary, studies repeatedly and consistently find that individuals with low health literacy are at a greater risk for poor overall health (Eadie, 2014). This includes personal attributes such as their physical activity level, weight, food choices as well as their use of medical services both preventive and actual in order to manage acute and chronic disease (Nutbeam, 2015). Furthermore, not only are individuals with low health literacy more likely to have poor health they are more costly to the healthcare system overall (Karl & McDaniel, 2018).

Health Literacy in Rural Populations

It is important to note the correlation between rurally located communities and their link to poor health outcomes (Wood, 2005). In general, it has been found that overall, living rurally places individuals at risk for multiple health-related deficits, such as decreased access to primary care and specialty providers and decreased access to general health information (Wood, 2005). Additionally, these individuals are at a greater risk for developing chronic health conditions (compared to those who live in urban areas) and delaying necessary treatments (Wood, 2005). The added risks that individuals face living rurally, coupled with potential low health literacy levels have also been studied (Chen et al., 2019). A study conducted by Chen et al. (2019), using 600 participants, found that rural residents with low health literacy levels are likely to further "exacerbate rural disparities," thus causing more issues with accessing health information and receiving specialty care (Chen et al., 2019, p. 405).

However, a study conducted by Aljassim & Ostini (2020) focused on determining if rurality could be defined as a "specific determinant of health literacy" (p. 2142). It was found that although urban populations have a tendency for higher health literacy levels

compared to those who live rurally, sociodemographics play a more important factor in determining each individual's health literacy level. Thus the study was unable to include rurality as a specific determinant of health literacy (Aljassim & Ostini, 2020).

Looking exclusively at the local SEK region, counties are defined as being mostly rural, with two counties being classified as a frontier (Romine & Horton, 2020). According to the most recent Southeast Kansas Regional Assessment, authored by Romine & Horton (2020), the SEK region reports some of the lowest health outcomes in the State of Kansas due to the lack of accessibility to healthcare facilities and physicians, financial hardship, transportation barriers, high uninsured rates and poor access to preventative care services. The percentage of individuals living rurally in Kansas (25.8%) is also higher than the national average (19.3%). A higher rurally located population also correlates with higher poverty rates (Romine & Horton, 2020). The poverty rate of the SEK area is again reported at a higher percentage (13.5% - 21.2%) when compared to the state of Kansas (12.8%) as a whole (Romine & Horton, 2020). Although there are specific programs in place to improve local disparities, Romine & Horton (2020) report that the rural status of the SEK has led to underfunded programs, lack of available healthcare services, smaller economies, food insecurity for children and families, lack of reliable and safe transportation and housing and more. There have been no widespread studies conducted in regard to determining health literacy levels within rural SEK; however, the impact of rurality on the community is evident (Romine & Horton, 2020).

In summary, although certain studies determine that sociodemographic characteristics versus living rurally attribute greater to health literacy levels, there is consensus in the fact that those who live rurally, and also have low health literacy levels,

are at greatest risk for poor health outcomes due to the risks in essentially compiling both separate entities (Chen et al., 2019).

Health Outcome Strategies

As discussed, throughout the review of literature studies were identified that observed a positive correlative relationship between health literacy deficits and poor patient health and health outcomes (Fernandez et al., 2016). The literature review also located research, mainly qualitative in nature, that discussed several health outcome improvement strategies for patients identified with low health literacy levels (CDC, 2019a). According to Nutbeam (2015), in order to improve health literacy levels, health education must be directed at structured education locations, such as health programs in schools for children, or a health care clinic in the community for adults. In order to be successful, the health strategies need to focus not only on changing lifestyle habits but also improving awareness of the negative consequences that specific health behaviors can have on an individual (Nutbeam, 2015).

To implement the different health literacy interventions, patient-specific strategies were designed (Nutbeam, 2015). Visscher et al. (2018) identified three types of interventions that health care professionals can utilize in order to improve health literacy. In summary, the interventions focused on either "interventions aimed at improving (aspects of) the health literacy level of individuals," "tailoring interventions to different health literacy levels," or "general interventions that aimed at improving health outcomes" (Visscher et al., 2018, p. 8).

Specific strategies have also been identified by Karl & McDaniel (2018) to include the "teach-back method; jargon-free, unhurried verbal communication; simple

illustrated written materials; continuing phone calls or text-targeted messages; and involving family and significant others" (p. 425). In addition to these suggestions, health professionals should always give their patient undivided attention during their interactions (Karl & McDaniel, 2018).

A case study was completed by Ingram & Kautz (2018) that surveyed an individual identified with low health literacy and the attempts that were made to improve the individual's health literacy level through different patient specific interventions. Both the teach-back strategy and the Listen, Explain, Acknowledge, Recommendations, Negotiations (LEARN) model were implemented (Ingram & Kautz, 2018). Results of the study showed that an individual's health literacy improved when the patient felt they were in a trusting environment that was personalized to their individuality (Ingram & Kautz, 2018). These studies reiterate the importance of being aware of client singularity and the importance of the client-professional interaction when utilizing the Interaction Model of Client Health Behavior framework in practice (Cox, 1982).

Health Literacy and Chronic Disease Management

Intervention specific studies, for individuals with low health literacy, have mainly been targeted at specific patient populations and disease processes. For example, McKenna et al. (2017) conducted a qualitative study that tracked study participants for a twelve-week period focusing on their health literacy specific to cardiovascular risk reduction (2017). Many key factors were found that were important in improving health literacy scores (McKenna et al., 2017). These factors included "emotional reactions, being able to access health services, work and home environment, affordability, accessing information from a primary care provider" and their relationship with their primary care

provider (McKenna et al., 2017, p. 1053). The results of this study showed that individuals who improved in regard to their health and their health literacy level were those who received enhanced communication with their provider, had a sense of control in their care regimen, and felt they were assisted in managing their condition and their medications (McKenna et al., 2017).

As mentioned, McKenna et al. (2017), discussed interventions targeting cardiovascular patients. Kim & Lee (2016) completed a meta-analysis of diabetic individuals identified with low health literacy. The results of their study found strategies to aid individuals with low health literacy and diabetes mellitus, specifically. Such strategies included "written communication, spoken communication, empowerment, and language or cultural consideration" (Kim & Lee, 2016, p. 331). More specifically to the diabetic population, the self-management interventions discussed with the participants led to better control of the patient's glycemic index (Kim & Lee, 2016). The study also reiterated the importance of a health care provider's role in creating action plans for their patients, those of which should include communication strategies in order to enhance literacy and improve specific health outcomes (Kim & Lee, 2016).

The National Library of Medicine [NLOM] (2020) reviewed a study that was conducted specifically on diabetic patients. The study found that among individuals with type two diabetes mellitus, low health literacy was "independently associated with worse glycemic control and higher rates of retinopathy" further showing that low health literacy "may contribute to the disproportionate burden of diabetes-related problems among disadvantaged populations" (para. 6). Schillinger et al. (2002) reiterates that such literature supports the notion that continued efforts must remain in place for diabetics.

The need for interventions that focus on diabetes specific health literacy improvement strategies, with the goal of improving each diabetic individual's overall health outcomes was reiterated (Schillinger et al., 2002).

Health Literacy and Practice Change Guidelines

According to Ylitalo et al. (2018), the ever-rising cost of healthcare, coupled with changes in hospital accountability measures "led to several national action plans to address limited health literacy" (p. 1). The U.S. Department of Health and Human Services (HHS) created a National Action Plan to Improve Health Literacy which was published in 2010. The focus was to place the responsibility of improving health literacy in the hands of "organizations, professionals, policymakers, communities, individuals and families in a linked, multisector effort to improve health literacy" (HHS, 2010, p. 1). Further, it was necessary that access to current and accurate health information be available, the interpersonal relationship between provider and patient be cohesive and emphasis was to remain on continuing education and health promotion (HHS, 2010).

More specifically, the action plan involved a society-wide health response with seven different goals (HHS, 2010). In summary, the goals involved developing accurate, accessible and actionable health and safety information; promoting changes to the healthcare system that improve communication, informed decisions, and access to healthcare services; incorporating standard based health information in childcare through to the university level; supporting and expanding efforts to provide adult education along with culturally appropriate health information within the community; building partnerships and changing policies as indicated; increasing basic research; developing interventions to improve health literacy in communities; and lastly increasing the use of

evidence-based health literacy practices (HHS, 2010). Since then, Healthy People 2030 has been released, which focuses on specific health communication and health information objectives (Healthy People, 2020). There are 19 total objectives, with seven baseline objectives, 11 developmental and one research objective (Healthy People, 2020). Data collection and progress tracking, in regard to objective achievement, will be conducted by the Health Communication and Health Information Technology workgroup (Healthy People, 2020).

Summary

The review of literature focused on various evidence-based publications that allowed for the summation of literature to support the explanation of health literacy, it's great significance to healthcare, the various health literacy screening tools available to identify health literacy levels, the correlative relationship between health literacy and patient health, health literacy within rural communities, the various health outcome improvement strategies present today and the effect that low health literacy levels can have on individuals who are also diagnosed with chronic diseases. The importance of keeping practice change guidelines in place for the nationwide improvement of health literacy was also reiterated.

Overall, the importance of understanding health literacy and its relationship with poor health outcomes has pushed for the common practice of utilizing health literacy screening tools to properly identify health literacy deficits in individuals across the United States and in many other countries (Rowlands, 2013). By identifying such deficits, more healthcare professionals are now in a position that allows for the implementation of patient-specific health literacy improvement strategies. This is done

essentially to improve patient overall health, for not only the individual, but their family and the community as a whole. The healthcare system itself could also positively be affected by being able to decrease the healthcare costs that have been routinely associated with low health literacy levels within the hospital system. This albeit general assessment and implementation plan coincides directly with the framework developed by Cheryl Cox (1982) that emphasizes the importance of recognizing client singularity and enforcing a positive client-provider interaction, which essentially leads to positive patient health outcomes. The literature supports that a positive health professional interaction, coupled with emphasis placed on health literacy level assessment and improvement strategies, would likely allow for the potential to improve health outcomes within our communities and across our nation.

CHAPTER III

METHODOLOGY

This chapter will describe the specific methodology behind data collection and sampling in regard to the Doctor of Nursing Practice (DNP) scholarly project and its focus on health literacy level assessment in rurally located diabetic patients.

Project Design

The DNP scholarly project in question is a mixed methods study that focused on health literacy level assessment through the use of a validated health literacy screening tool, titled the Newest Vital Sign (NVS), as well as through a structured questionnaire given to the certified diabetic educator (CDE) upon completion of the health literacy level assessments. The NVS screening tool was administered in person by the DNP student and the CDE of the Community Health Center of Southeast Kansas (CHCSEK), both of whom were registered nurses (RN) with Bachelor of Science in nursing (BSN) degrees. This specific study design was chosen in order to allow for the additional use of qualitative data in a study that is based primarily in quantitative data collection. According to Creswell (2008), the embedded mixed methods study design is useful when the study includes "the collection of both quantitative and qualitative data, but one of the data types plays a supplemental role within the overall design" (p. 68). Overall, this study design allowed for qualitative data to be collected and used in a supportive and secondary

role (Creswell, 2008). Support for the chosen location of the DNP scholarly project was found in evidence through research by Nutbeam (2015) that emphasized the importance of using a structured educational location, such as a health care clinic for adults, when attempting to cultivate an environment that would support health literacy level improvement, such as is found with the diabetic self-management education (DSME) classes offered by the CHCSEK.

Target Population

The target population for the project included patients who had been previously diagnosed with prediabetes mellitus, type one diabetes mellitus or type two diabetes mellitus. The specific patients were those who voluntarily signed up for the free DSME classes taught by the CDE employed by the CHCSEK. The DSME classes are historically offered six times each month at different CHC locations throughout rural SEK. As a part of their duties, the CDE travels each week to areas as far as an hour away to provide education to rurally located patients. Additionally, both group and individual diabetic education sessions are completed by the patients. The locations of the rural CHCSEK clinic sites include the Kansas towns of Arma, Baxter Springs, Coffeyville, Columbus, Fort Scott, Independence, Iola, Mound City, Parsons, Pittsburg, Pleasanton, and also Miami, Oklahoma. For the purpose of the DNP scholarly project, data was collected from the group DSME classes held at the Baxter Springs, Kansas, clinic location.

The second targeted population included the individual CDE who was employed by the CHCSEK. The CDE was administered a structured questionnaire after the project was completed.

Target Population Recruitment

The project took place utilizing purposive sampling. This type of sampling is a non-probability sampling technique that allows for focus on specific characteristics within a "population of interest", such as diabetic patients attending the DSME classes (Laerd Dissertation, 2012, para 4). Although this is not the strongest sampling technique, it allowed the greatest number of diabetic patients within rural SEK to be surveyed (Laerd Dissertation, 2012). Participants were asked if they would voluntarily complete the healthy literacy assessment screening tool, with an additional demographic survey, following their scheduled DSME class. For those who agreed, the survey was administered by the CDE and the DNP student. The survey was available to be administered in both English and Spanish; however, it was only administered in English due to the DNP student not being fluent in the Spanish language.

The CDE was recruited by asking if they were willing to participate in an open-ended questionnaire after the project was completed. The questionnaire asked their personal opinion regarding the health literacy levels of the diabetic patients they serve, their opinion on the addition of the NVS to the DSME classes, and if they believed there was a need for continued education and health literacy level assessment in the CHCSEK diabetic population.

Inclusion and Exclusion Criteria

The main inclusion criteria for the survey participants were that they were attending the DSME classes; they had been previously diagnosed with either prediabetes mellitus, type one diabetes mellitus, or type two diabetes mellitus; they were a willing participant; and they could communicate using the English language. The inclusion

criteria for the CDE were that they were a registered nurse who was a certified diabetic educator, they were a current instructor for the DSME classes at the CHCSEK, and they were willing to answer the questionnaire.

Exclusion criteria for the survey participants included those who were less than 18 years of age, pregnant women, the mentally disabled, non-English speaking persons, and those who were unable to complete the survey either voluntarily or involuntarily. The exclusion criteria for the CDE included a registered nurse who was not a certified diabetic educator, who did not assist with completion of the surveys and who was unwilling to complete the questionnaire.

Protection of Human Subjects

The DNP scholarly project was presented to and approved by the DNP student's scholarly project committee, including at least seven (quorum) Irene Ransom Bradley School of Nursing faculty (Appendix B), and the Institutional Review Board (IRB) of Pittsburg State University (PSU), (Appendix C). It was also presented to and approved by Risk Management, the Legal Counsel, Clinical Leadership, and the vice president of clinical education of the CHCSEK (Appendix D). This allowed for complete approval and protection of human rights prior to the DNP scholarly project actually taking place.

There were risks and benefits associated with the DNP scholarly project. The risks included potential psychological consequences, such as emotional stress or discomfort as the assessment of a patient's health literacy level could have caused potential embarrassment. However, according to the National Library of Medicine ([NLOM] (2015), a study was conducted in 2010 that found that after administering the NVS to 179 patients at a family care clinic, the screening did "not generate shame or

embarrassment to most patients" also "nearly all patients said they would recommend similar a health screening" (para, 41). There was minimal risk for the CDE's involvement, as well as minimal physical, confidentiality or legal risks noted for the project.

The benefits of the DNP scholarly project included the data obtained from the patients, as this provided information for the medical professionals of the CHCSEK in regard to their diabetic population's health literacy levels. Data obtained from the CDE also provided valuable insight into the health literacy level assessment measures and the continuance of the DSME classes at the CHCSEK. The confidentiality of all subjects was protected as there was no personal identifying measures collected or used throughout the project, from either the participants or the CDE. All risks and benefits were discussed with both sets of subjects prior to their participation in the project.

Instruments

The five key variables in the DNP scholarly project included the certified diabetic educator, diabetic patients, health literacy, the Newest Vital Sign screening tool, and rural location. Their operational definitions are as follows:

- **Certified Diabetic Educator**: a registered nurse who "specializes in educating, supporting, and promoting self-management of diabetes" (A. Massey, 2019, para 1). The CHCSEK diabetic educator was certified by the Certification Board for Diabetes Care and Education and is in charge of delivering the DSME classes held at the various CHCSEK clinic locations. Their credentials and years in practice were self-reported on the questionnaire.

- **Diabetic Patients**: any patient attending the group DSME classes at the CHCSEK who had been previously diagnosed with either prediabetes mellitus, diabetes mellitus type one or diabetes mellitus type two. The type of diabetes the patient had previously been diagnosed with was self-reported on the demographic section of the survey.
- **Health Literacy**: the "degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others" (CDC, 2021, para 2). Health literacy was assessed utilizing the NVS screening tool.
- **Newest Vital Sign**: a standardized health literacy assessment screening tool that was developed and validated against the previously endorsed and discussed measure of health literacy, the Test of Functional Health Literacy in Adults (TOFHLA) and the Rapid Estimate of Adult Literacy in Medicine (REALM) screening tools. The NVS incorporated prose, numeracy, and document literacy, all of which comprise health literacy. The NVS screening tool was available free to all medical and public health providers through Pfizer Incorporated as a part of the Clear Health Communication initiative (Pfizer, 2020). The company continues to have extensive resolve in furthering health literacy research, collaboration opportunities, healthcare professional and public policy initiatives and continued health education for patients and their families (Pfizer, 2020). The NVS screening tool was available in both English and Spanish. The NVS was administered in person utilizing an ice cream nutrition label as the basis for its questions. The patient had the screening tool with the ice cream label printed out in front of them

as they completed the screening. The screening tool was retyped by the DNP student in order for the answers to the questions to not be visible to the patient. There were six screening tool questions in total (Appendix E). The tool was administered by the DNP student in the presence of the CDE. The six screening tool questions were open-ended questions that allowed for a numeric summation of the responses, with each question being worth one point. A possible score range from 0-6 resulted, with each numeric score correlating with a specific health literacy level. There were also six demographic questions asked as a part of the survey, which included age, gender, race/ethnicity, diabetic diagnosis (pre, type one, or type two), education and insurance status (Appendix F). Nominal data was collected from the scores of the survey. Scores of 0-1 suggested a high likelihood (0-50% or more) of limited health literacy (Pfizer, 2011). Scores of 2-3 indicated the possibility of limited literacy (Pfizer, 2011). Scores of 4-6 almost always indicated adequate literacy (Pfizer, 2011).

- **Rural Location**: included those populations, housing, or territories not in an urban area, with urban areas defined as a population of 50,000 or more with clusters of at least 2,500 (U.S. Department of Agriculture, 2019). All CHCSEK clinics were considered to be located within the rural SEK area.

Internal Review Board Approval

The DNP scholarly project's official proposal was presented to the DNP student's personal scholarly project committee. The meeting was conducted virtually via Zoom. Upon approval of the proposal by the scholarly project committee, IRB application was submitted to the Irene Ransom Bradley School of Nursing (IRBSON) IRB committee.

Once approved at the IRBSON level, the IRB application was advanced to the PSU IRB Committee. Approval was also obtained through the CHCSEK after a meeting with the vice president of clinical education, Legal Counsel, Clinical Leadership, Risk Management, and the chief medical officer, where a review of the project proposal took place. The focus of this meeting was to obtain approval for using their cohort of patients attending the monthly DSME classes, as well as to administer a questionnaire to their CDE at the completion of the project. After project approval, the time frame for data collection was set to range from December of 2020 to February of 2021. However, surveys were only distributed at two DSME classes during the month of December at the Baxter Springs, Kansas clinic location by the DNP student and the CDE.

Project Resources

The resources required for the project included access to the DSME classes at each CHCSEK clinic through working closely with the CHCSEK's CDE. Other resources included access to a computer system in order to develop, verify, and print the screening tool and demographic survey for distribution at each DSME class, and to develop, verify, and distribute the questionnaire for distribution to the CDE. Fiscal resources included the cost of printing, paper, and pencils, as well as gas for travel to the Baxter Springs, Kansas, location.

Procedure

After determining appropriate eligibility, the participants were asked if they would voluntarily take the NVS screening assessment and answer the demographic questions at the end of their DSME class. This allowed for the potentially unwilling participants to leave directly after their class if they did not wish to complete the survey.

The CDE was asked if they would voluntarily answer the seven-question questionnaire after the project was completed. The CDE agreed to answer the questionnaire after the completion of the project (Appendix G). The results of the project were shown to the CDE following their response to the questionnaire. The results of the project were also shown to the CHCSEK to comply with the approval agreement for the project.

Each patient completed the six-question screening tool and answered the six demographic questions on the back of the survey. This was the extent of all data collection from the patients. The survey was voluntary and not required. The DNP student attended the two CHCSEK DSME classes located in Baxter Springs, Kansas and administered the survey with the CDE present at all times.

The CDE completed the seven-question questionnaire after the completion of the project. The questionnaire was administered by the DNP student virtually through e-mail. The decision to be administered virtually, versus in person, was left up to the preference of the CDE. The questionnaire was also voluntary and not required.

Data was collected and inputted manually, as the survey questions were open-ended responses and were completed with pencil and paper. All surveys from the clinic location were placed in a manilla envelope by the DNP student for transport to prevent loss of any surveys. The DNP student stored the completed surveys in one folder until ready to input the results into a secure electronic database. Once surveys were inputted into the electronic database, they were placed into a manilla envelope labeled “Complete Surveys: Input into Electronic Database Complete.” These surveys will be stored in a locked cabinet in the scholarly project faculty advisor’s office for six months after

completion of the project and then will be shredded. The electronic database will also be deleted six months after the completion of the project. The electronic database was located on the DNP student's personal computer that was password protected. The data was safeguarded, and each human subject's confidentiality was protected as no personal identifying information were collected during data collection. Project protocol was maintained as the NVS template included a specific answer bank, as well as a specific interpretation protocol for each patient's scores (Appendix H). The outcome data collected was the health literacy level of each patient attending the DSME class, the different demographics that were self-reported from each participant and the questionnaire responses from the CDE.

As previously mentioned, the questionnaire for the CDE, collected by the DNP student, was answered virtually through e-mail. The data was inputted manually into the same password protected electronic database that stored the data collected from the surveys. The questionnaire response was sent and received by e-mail. The e-mail used was the DNP student's PSU password protected e-mail account. The e-mail received was deleted after its contents were transferred to the DNP student's electronic database. The entire electronic database, with participant and the CDE's data responses, will be deleted six months after the project is completed.

Outcomes

The scholarly project outcomes are a result of the assessment of individual health literacy levels, collected demographic information and qualitative data gathered during the entirety of the project. Each aspect of the project was developed in order to allow for measurable outcomes.

Tools Described and Linked to Objectives

The NVS screening tool was linked directly to the objectives of the project. The tool provided the likely health literacy level of each participant filling out the survey. Each survey response was nominally inputted and scored through Pfizer's (2020) protocol. The demographics that were self-reported by each patient were also inputted and analyzed through IBM SPSS software. The responses from the CDE questionnaire were used to provide additional insight and support for the objectives of the project in a narrative format.

Methods of Analysis for each Measurement

The anticipated n size was calculated by asking the CDE the number of participants that attend the DSME sessions at all clinic locations each year. This data was provided through the CHCSEK's yearly data report which showed that a total of 418 patients were scheduled to attend the DSME classes. Of the 418 patients, a total of 183 actually attended and participated in the DSME classes for the year of 2020. According to the CDE, there were a number of repeat patients; however, the approximate number of repeat patients was not obtained. This data allowed for the calculation of the anticipated n size, or optimum number of participants, which allowed for a statistically significant target sample size of n=35. The confidence level used for data analysis was 0.95 and the confidence interval used was 15%. Each participant's demographics and health literacy levels were analyzed using relative frequency statistics through IBM SPSS software. Correlational statistics were not run between the various demographic factors and the health literacy levels, as the sample size was not large enough for statistical significance.

The questionnaire responses from the CDE were displayed in a narrative format to allow for an accurate representation of the CDE's viewpoint.

Evaluation Measures Linked to Objectives

The evaluation measures included the results of the health literacy level screening tool, the results of the demographic surveys, and the questionnaire responses obtained from the CDE. Each result was a direct response to the objectives of the project which focused to determine the health literacy level of rurally located diabetic patients, to better understand the demographics of each diabetic patient and to further the understanding and need for continued or more extensive diabetic education within the CHCSEK diabetic community.

Project Sustainability

The sustainability plan for the project included organizational support from the CHCSEK, community support through patient willingness to participate, staff training and continued monitoring and evaluation of the project results. One of the main goals for the Pfizer corporation (2011), who developed the "NVS Toolkit," was to incorporate it into an assessment completed at each patient visit (inpatient or outpatient) while taking the vital signs of each patient. The goal was to allow medical professionals to understand whether or not their patient is at risk for the poor outcomes frequently associated with limited health literacy levels. The sustainability of the project, in terms of continued health literacy assessment, relies on the aforementioned concepts, with emphasis placed on the willingness of health organizations and healthcare professionals to their patient community.

Summary

A mixed method study design was utilized for the project, coupled with a purposive sampling technique that allowed for data collection from prediabetic, type one or type two diabetic patients who attended DSME classes offered by the CHCSEK. The focus of the project was health literacy level assessment utilizing the validated NVS screening tool, as well as the collection of self-reported demographic data. A structured questionnaire given to the CDE following completion of the project was also performed. Data analysis was conducted using relative frequency statistical analysis through the use of IBM SPSS software. Qualitative responses from the CDE questionnaire were presented using a narrative format.

CHAPTER IV

EVALUATION OF RESULTS

This chapter will include specifics regarding the evaluation of the four proposed project questions for the Doctor of Nursing Practice (DNP) scholarly project and its focus on health literacy level assessment in rurally located diabetic patients.

Restatement of Purpose

The purpose of the DNP scholarly project was to gather data that would allow the DNP student to analyze survey results indicating the likely health literacy level of either prediabetic, type one or type two diabetic individuals who attended the Diabetes Self-Management Education (DSME) classes, instructed by the certified diabetic educator (CDE) of the Community Health Center of Southeast Kansas (CHCSEK). The survey included utilizing the Newest Vital Sign (NVS) health literacy screening tool, as well as asking six demographic questions of each participant. The CDE also completed a structured open-ended questionnaire to allow for a greater understanding of the needs for the diabetic patients residing in rural Southeast Kansas (SEK). The project questions that were evaluated include the following:

1. Utilizing the Newest Vital Sign (NVS), what are the estimated health literacy levels of diabetic patients attending Diabetes Self-Management Education

(DSME) classes at the Community Health Center of Southeast Kansas (CHCSEK) clinic locations?

2. What are the demographics regarding age, gender, race/ethnicity, diabetes mellitus type (prediabetic, type one diabetic, type two diabetic), education and insurance status of the diabetic patients attending DSME classes at the CHCSEK clinic locations?
3. Do the identified health literacy levels of diabetic patients attending DSME classes at the CHCSEK clinic locations suggest support for the need of continued diabetic education, as a whole, moving forward?
4. Will adding the NVS to the DSME classes at the CHCSEK clinic locations increase the awareness and knowledge regarding the health literacy levels and the educational needs of the diabetic patients in attendance?

Sample Description

After approval from Pittsburg State University School of Nursing, Pittsburg State University Institutional Review Board and the CHCSEK, data was collected in December, 2020. A purposive sampling technique was used to locate potential participants by focusing on either prediabetic, type one diabetic, or type two diabetic individuals who attended the DSME classes offered through CHCSEK's diabetic education program. Participants were voluntarily recruited. The included participants were at least 18 years of age, had a diagnosis of either prediabetes, type one diabetes or type two diabetes and utilized English as their primary language. Those who were less than 18 years of age, non-English speaking, pregnant, mentally disabled or unwilling to take the survey were excluded from the project. Demographic data for each participant

was divided into age, gender, race/ethnicity, diabetes diagnosis, education and health insurance status. Each participant's health literacy level was collected separately using the NVS screening tool. After the survey was completed, the data was aggregated and reflected a total sample population of six participants. The CDE employed by the CHCSEK, whose role coupled as the DSME class instructor, also completed an open-ended questionnaire for the project.

The following chapter will review the aggregated data from the participants and the CDE in order to answer the proposed DNP scholarly project questions. Data analysis was performed with IBM SPSS by finding the frequency of each participant survey response, as well as noting the themes identified through the questionnaire responses provided from the CDE.

Analyses of Project Questions

There were four project questions addressed surrounding the identification of the health literacy levels of diabetic patients located in rural SEK and their potential needs moving forward. The project questions will be analyzed and evaluated separately below to ensure each question is answered in its entirety.

Project Question 1: Utilizing the Newest Vital Sign (NVS), what are the estimated health literacy levels of diabetic patients attending Diabetes Self-Management Education (DSME) classes at the Community Health Center of Southeast Kansas (CHCSEK) clinic locations?

Each participant was asked to voluntarily complete the NVS health literacy screening tool, which consisted of six questions regarding an ice cream nutrition label that was provided to them. Their responses were calculated using the Newest Vital Sign

score sheet. This placed each participant into one of three possible health literacy level categories. The scores from each NVS screening tool were manually computed by the DNP student and subsequently scored. According to the NVS score sheet, scores of 0-1 suggested a high likelihood (50% or more) of limited health literacy, scores of 2-3 indicated the possibility of limited health literacy, and scores of 4-6 almost always indicated adequate health literacy (Pfizer, 2020). Of the six total participant responses, three participant's scores (50%) indicated a high likelihood of limited health literacy, while the other three participants (50%) showed scores that indicated adequate health literacy (Table 1). No participant scores were reflected in the middle tier, which would have indicated the possibility of limited health literacy.

Table 1

Frequency and Percent of Participant Health Literacy Level Scores

Health Literacy Level Score	Frequency (n=6)	Percent (%)
0-1	3	50%
2-3	0	0%
4-6	3	50%
Total	6	100%

Project Question 2: What are the demographics regarding age, gender, race/ethnicity, diabetes mellitus type (prediabetic, type one diabetic, type two diabetic), education and insurance status of the diabetic patients attending DSME classes at the CHCSEK clinic locations?

The participant's demographics were self-reported and later aggregated to allow for a greater understanding of the patient population attending the DSME classes throughout rural SEK, separate from their identified health literacy level. Each

demographic was evaluated separately. The tables that follow review the provided responses and offer a summary of the participant demographics for the project. Due to the inability to collect data from a statistically significant sample size (n=35), correlational statistics were not computed between the health literacy level of the participants and their demographic responses.

Table 2

Frequency and Percent of Participant Age

Age	Frequency (n=6)	Percent (%)
40-49	4	66.7%
50-59	1	16.7%
60-69	0	0%
70-79	1	16.7%
Total	6	100%

For data analysis, participants were divided and placed into four age groups ranging from 40 years of age to 79 years of age. The majority of participants fell between the ages of 40-49 (66.7%). Participants between the ages of 50-59 and 70-79 were both identified as the second highest age group (16.7%). There were no participants between the ages of 60-69 (0%).

Table 3

Frequency and Percent of Participant Gender

Gender	Frequency (n=6)	Percent (%)
Female	4	66.7%
Male	2	33.3%
Nonbinary	0	0%

There were six total individuals that participated in the project. There were four female subjects (66.7%) and two male subjects (33.3%). There were no participants that identified as nonbinary (0%).

Table 4

Frequency and Percent of Participant Race/Ethnicity

Race/Ethnicity	Frequency (n=6)	Percent (%)
African American or Black	0	0%
American Indian or Alaskan Native	0.5	16.7%
Asian or Pacific Islander	0	0%
Hispanic or Latino	0.5	16.7%
White or Caucasian	5	83.3%
Other	0	0%
Total	6	100%

The participants were asked to self-identify as either African American or Black, American Indian or Alaskan Native, Asian or Pacific Islander, Hispanic or Latino, White or Caucasian, or could manually write in a racial/ethnic response. Of the six participants, five identified as White or Caucasian (83.3%) and one participant identified as both Hispanic and American Indian (16.7%).

Table 5

Frequency and Percent of Participant Diabetes Diagnosis

Diabetes Diagnosis	Frequency (n=6)	Percent (%)
Prediabetic	0	0%
Type One Diabetic	0	0%
Type Two Diabetic	5	83.3%
Unsure	1	16.7%

The participants were asked to report whether they had been previously diagnosed with prediabetes, type one diabetes, type two diabetes, or report that they were unsure of

their diabetes diagnosis. Of the six participants, five reported that they had been previously diagnosed with type two diabetes (83.3%), while one participant was unsure of their diabetes diagnosis status (16.7%).

Table 6

Frequency and Percent of Participant Education

Highest Level of Education	Frequency (n=6)	Percent (%)
Less than High School	0	0%
High School Graduate	2	33.3%
Vocational Training/Technical School	2	33.3%
Some College	2	33.3%
Bachelor's Degree	0	0%
Advanced Degree	0	0%

The participant response to the highest level of education completed was evenly distributed between High School Graduate (33.3%), Vocational Training/Technical School (33.3%) and Some College (33.3%). There were no participants who reported their highest level of education being less than high school, a bachelor's degree, or an advanced degree (0%).

Table 7

Frequency and Percent of Participant Health Insurance Status

Health Insurance Status	Frequency (n=6)	Percent (%)
Public Insurance (Medicare, Medicaid, other public)	3	50%
Private Insurance (Employer sponsored, Individual Plans, Exchanges)	2	33.3%
Uninsured	1	16.7%
Other	0	0%

The participants were asked to report whether they received public insurance, private insurance, if they were uninsured, or they could manually write in a different healthcare insurance response. Half of the participants reported receiving public

insurance (50%). Two participants (33.3%) reported receiving private insurance, while one participant (16.7%) reported being uninsured.

Project Question 3: Do the identified health literacy levels of diabetic patients attending DSME classes at the CHCSEK clinic locations suggest support for the need of continued diabetic education, as a whole, moving forward?

In order to provide evidence to answer project question 3, the health literacy levels of each DSME class participant were assessed using the NVS (Table 1). This showed that half (50%) of the total participant's (n=6) scores indicated limited health literacy levels. For additional evidence, the CDE was given a seven question open-ended questionnaire via e-mail (Appendix G). Select responses to the questionnaire will be provided in a narrative format below, while entire responses to each question will be provided in Appendix I.

First, the CDE was asked three questions regarding their educational background, where it was self-reported that the CDE is a registered nurse with a bachelor's degree who reported a history of working within diabetic education for 12 years, and being a certified diabetic educator for eight years (Appendix I). When the CDE was questioned regarding their opinion on what they assumed the health literacy levels of the DSME class participants they regularly instruct were, the CDE responded with "limited health literacy" (Appendix I). When asked if, in the CDE's opinion, there was a continued need for diabetic education within the rural SEK community, the CDE responded with,

> Yes. There are many, many diabetics as well as even more pre-diabetics in this area. If we had more education, maybe we could help prevent or delay the onset of the disease in those that do not have it yet. And if people understood what

> happens in their bodies when they have uncontrolled blood sugars, it might help them maintain better control. Teaching people in a way they can understand, not making it too difficult or unattainable, this too, is so important (Appendix I).

Project Question 4: Will adding the NVS to the DSME classes at the CHCSEK clinic locations increase the awareness and knowledge regarding the health literacy levels and the educational needs of the diabetic patients in attendance?

The seven-question open-ended questionnaire provided to the CDE via e-mail was used to provide evidence for project question 4. Select responses will be provided in a narrative format below, while entire responses to each question will be provided in Appendix I. When asked if the addition of the NVS to the DSME sessions would increase the CDE's awareness of each participant's health literacy level and their educational needs, the CDE responded with,

> I felt like the assessment tool used in this demonstration was actually too difficult for many of my patients. I personally do not feel this specific tool is effective or adequate to determine literacy inadequacies. I am in constant assessment during my time with patients doing little tests and questions during my education presentation to give me an indication as to how to present to this specific group and how to help them understand if I see that they are not. I do feel very strongly that as so many appointments are changing to phone visits during this time of pandemic, that that would make it even more difficult to determine health literacy as I find it very important to be able to watch people's expressions and body language to help me determine if they are understanding the materials presented (Appendix I).

The CDE was additionally asked their opinion regarding how the NVS could be potentially utilized in the future to positively affect the diabetic patients of the CHCSEK. The CDE responded with,

> I would need to see options NVS offered as far as testing tools as well as evidence they present from their studies before I would be convinced this would help in determining HL. To me, with my patients, I can see it might cause frustration. I teach a lot about the food label, and I would prefer to tweak it more towards what is needed to help them function as a diabetic (Appendix I).

Summary

In summary, a total of six participants verbally consented to participate in the project. Data analysis for the project was conducted utilizing the IBM SPSS software package. The NVS scores were manually scored by the DNP student using the Pfizer protocol. Descriptive analysis of the health literacy levels and the demographic data were computed using each participant's scored NVS response and their self-reported age, gender, race/ethnicity, diabetes type, educational level and healthcare insurance status for all prediabetic, type one diabetic or type two diabetic individuals who participated in the survey. The CDE's questionnaire responses were utilized in a narrative format to provide evidence for project questions three and four.

Half of the participants (50%) were identified as having a "high likelihood (50% or more) of limited health literacy" (Pfizer, 2011, p. 6), while the other half of the participants (50%) were identified as "almost always indicates adequate health literacy" (Pfizer, 2011, p. 6). The largest group of participants were those who identified as being White or Caucasian (83.3%) and being between the ages of 40-49 (66.7%). There were

more female participants (66.7%) than male (33.3%). Over half of the participants (83.3%) identified as being a type two diabetic with one participant being unsure of their diabetic diagnosis type (16.7%). The highest level of education was evenly distributed between high school graduate (33.3%), vocational training/technical school (33.3%) and some college (33.3%). Half of the participants (50%) reported receiving public health insurance. Private insurance was the second highest reported health insurance (33.3%) while one participant reported being uninsured (16.7%).

Support for the continued need for diabetic education in the rural SEK community was indicated through half (n=3) of the total participants (n=6) scores indicating limited health literacy. Additional evidence was provided through narrative support from the CDE that reiterated the increased number of diabetic and prediabetic individuals in the SEK area, as well as the need for education that adapts to each patient's specific educational needs.

The addition of the NVS to the DSME classes offered at the CHCSEK, in order to increase health literacy level awareness and patient educational needs, was not supported. This was evidenced by the narrative responses received from the CDE. It was indicated that the NVS may be too difficult for a majority of the patients, which could cause patient frustration. The CDE was also unsure of the adequacy of the tool to determine health literacy deficiencies. Key points were reiterated by the CDE, including the importance of instead tailoring needs based on continuous patient assessment and determining if each patient understands information being taught through facial expressions and body language, versus through the utilization of a screening tool, such as the NVS.

CHAPTER V

DISCUSSION

This chapter will include a thorough discussion regarding the results of the project and their applicability to the four project question outcomes, as well as discussion regarding the chosen theoretical framework, the logic model, limitations of the study design and implications for future projects and practice.

Restatement of Purpose

The overall purpose of the Doctor of Nursing Practice (DNP) scholarly project was to determine the likely health literacy levels of the prediabetic, type one diabetic, or type two diabetic patients participating in the Diabetes Self-Management Education (DSME) classes led by the certified diabetic educator (CDE) of the Community Health Center of Southeast Kansas (CHCSEK) through the utilization of the Newest Vital Sign (NVS) screening tool. Secondary goals included defining the specific demographics of each participant, determining if there was a continued need for health literacy level assessment and continued diabetic education within the rural southeast Kansas (SEK) diabetic community, as well as whether or not the addition of the NVS to the DSME classes would be beneficial.

Relationship of Outcomes to Research

There were four total project questions that were evaluated by the DNP scholarly project. Each question was answered thoroughly and will be discussed in greater detail below.

Project Question 1: Utilizing the Newest Vital Sign (NVS), what are the estimated health literacy levels of diabetic patients attending Diabetes Self-Management Education (DSME) classes at the Community Health Center of Southeast Kansas (CHCSEK) clinic locations?

The first project question was answered by determining the health literacy level of each participant (n=6) who voluntarily completed the NVS screening tool. The NVS screening tool included six questions regarding an ice cream nutrition label. Each response from the screening tool correlated with a numeric which allowed for the summation of the responses to reflect a score between 0-6. The individual score and the health literacy level correlation for each participant was determined by using the NVS score sheet provided by Pfizer's (2011) NVS protocol and handbook. Descriptive frequency statistics were utilized through IBM SPSS, which indicated results that determined 50% of the participants (n=3) had a high likelihood of limited health literacy, while the other 50% of the participants (n=3) likely had adequate health literacy.

The results of the NVS were split between those whose scores indicated limited health literacy and those whose scores indicated adequate health literacy. These scores reveal that, for the two surveyed DSME sessions, the health literacy level of participants varied substantially. This may make it more difficult for educational purposes, especially in regard to the CDE and their ability to potentially balance educational delivery systems

that can effectively reach both health literacy level variances. However, the sample size for the project was not statistically significant, requiring n=35 versus the collected n=6, causing the health literacy level scores collected unable to significantly represent the rural SEK diabetic population and their health literacy levels. Although, it can give some general indications, the results are not statistically significant.

Project Question 2: What are the demographics regarding age, gender, race/ethnicity, diabetes mellitus type (prediabetic, type one diabetic, type two diabetic), education and insurance status of the diabetic patients attending DSME classes at the CHCSEK clinic locations?

The second project question sought to determine the demographics of each DSME participant. There were six total demographic questions that were asked, which were listed in a multiple-choice format, additionally leaving the option for the participant to write in responses if they did not personally identify with specific demographics. The six demographic questions included questions regarding age, gender, race/ethnicity, diabetes mellitus type (prediabetic, type one diabetic, type two diabetic), education and insurance status. The demographic results were computed through the utilization of IBM SPSS and descriptive statistical frequencies. Due to an inadequate sample size for statistical significance (n=35), no correlational statistics were run between the participant's health literacy levels and their demographics responses.

Statistical analysis of the demographic survey responses indicated that the majority of participants identified as being White or Caucasian (83.3%) and being between the ages of 40-49 (66.7%). More female participants were in attendance (66.7%) than male (33.3%). Over half of the participants identified as being a type two diabetic

(83.3%) with one participant unsure of their diabetes diagnosis type (16.7%). The highest level of education for each participant was evenly distributed between high school graduate (33.3%), vocational training/technical school (33.3%) and some college (33.3%). The most commonly reported health insurance provider was public health insurance (50%), while private insurance (33.3%) was the second most commonly reported method of health insurance. One participant (16.7%) reported being uninsured.

As previously discussed, the sample size was not large enough to be statistically significant (n=35) in adequately representing the diabetic patients of the CHCSEK. However, the American Diabetes Association [ADA] (2021) reports that type two diabetes is the most common form of diabetes, which is reflective of the obtained demographic data. Additionally, the Centers for Disease Control and Prevention (2020) reported that the majority of diagnosed diabetics were between the ages of 45-64 and those whose race/ethnicity falls under American Indians/Alaska Natives, people of Hispanic origin, non-Hispanic blacks, non-Hispanic Asians and non-Hispanic whites. Furthermore, the demographic profile for rural SEK, in regard to race/ethnicity, reported that the highest ethnic group consisted of non-Hispanic whites, ranging from 86.9% to 95.9% per county (Romine & Horton, 2020). In regard to gender, there are more females (50.4%) than males (49.6%) living in rural SEK (Romine & Horton, 2020). The average educational attainment for the residents of rural SEK included approximately 87% to 97% with a high school degree, 24% to 29% reporting some college, and 7% to 12% reporting obtaining an associate degree, with ranges listed between counties (Romine & Horton, 2020). Reports regarding health insurance status were available, although they did not indicate public versus private, nor individual versus family (Romine & Horton,

2020). The report indicated that 64,720 families in the SEK area have health insurance while 14,266 families do not (Romine & Horton, 2020). Overall, the collected demographic data, although not statistically significant, was seen as a relative representation of the general population within rural SEK.

Project Question 3: Do the identified health literacy levels of diabetic patients attending DSME classes at the CHCSEK clinic locations suggest support for the need of continued diabetic education, as a whole, moving forward?

The third project question aimed to determine if the participants, and their identified health literacy levels, indicated the need for continued diabetic education in rural SEK. To answer this project question, the data collected from the NVS screening tool, as well as narrative support from the CDE was utilized. As mentioned, although statistically insignificant, 50% of the participants NVS results indicated a high likelihood (of 50% or more) of limited health literacy. When the CDE was asked to take an educated guess (with no statistical merit) regarding the health literacy level of the patients that are educated daily by the CDE, the CDE responded by placing the patients in the category of limited health literacy. Additionally, the CDE indicated that, from their perspective as a CDE working in diabetic education for 12 years, and being certified for eight years, there are multiple diabetic and prediabetic individuals living in rural SEK that need additional education and assistance to manage their diabetes. The CDE also reiterated the importance of understanding and tailoring diabetic education to each patient's specific educational needs.

Within rural SEK, the range per county of those diagnosed with diabetes mellitus is between 24.9% to 32% (Romine & Horton, 2020). With an estimated total population

of 183,747 individuals living between all 12 counties of rural SEK, that equates to approximately 45,753 to 58,799 individuals diagnosed with diabetes (Romine & Horton, 2020). That is a relatively large number of individuals who, living rurally, have less access to resources, education, and specialty health care (Romine & Horton, 2020).

Overall, although there is no statistical significance to the number of participants who scores reflected limited health literacy, any percentage of patients with limited health literacy places the individual, family and community at risk for issues in regard to managing their chronic diseases, difficulty navigating the healthcare system, increased risk for hospital admission and readmission, higher mortality rates, and more (Fernandez et al., 2016). Furthermore, diabetic education in rural communities has been addressed in the literature, which reports that diabetes is 17% more prevalent in rural areas versus central cities (Maez et al., 2014). Best practice guidelines include the importance of continuing to provide such diabetic education, as well as encouraging local primary care providers and community health centers to offer and promote diabetic education in a culturally competent way (Maez et al., 2014). It was concluded that the DSME classes offered by the CHCSEK are a tremendous resource for the diabetic patients of rural SEK and should remain in place to educate the numerous diabetic patients within its region.

Project Question 4: Will adding the NVS to the DSME classes at the CHCSEK clinic locations increase the awareness and knowledge regarding the health literacy levels and the educational needs of the diabetic patients in attendance?

The fourth project question intended to determine if adding the NVS to the DSME classes would benefit the CDE and their ability to provide education that fit the participant's heath literacy level and educational needs. This was answered through the

responses obtained from the questionnaire that was administered to the CDE. The CDE did not support the addition of the NVS to the DSME classes offered at the CHCSEK clinics. As previously mentioned, the CDE believed that a majority of the patients seen and educated through the group and individual DSME classes would fall into the category of limited health literacy. The CDE felt that they have been able to determine whether or not a patient understands the education being presented to them through personal attention to each individual's facial expressions and body language without necessarily requiring a screening tool to do so. The CDE went into detail regarding the use of constant assessments and tailoring each DSME session to the educational needs of the specific patient group that is present during each specific session. Additionally, the CDE reported that they felt the NVS was too difficult for a majority of the patients that attend the DSME classes and could likely cause frustration. The CDE also reported that they discuss the food label extensively during the DSME classes, and because the NVS asks questions surrounding a nutrition label, the CDE felt that that time and education should be tailored more to the patient's needs and what they specifically need to know to effectively function as a diabetic.

Although the initial thought was that having the NVS available to assess the patients that attend each DSME class would allow for additional statistical data and support, if it were ever needed, to ensure that the DSME classes would still be operated and offered by the CHCSEK, the CDE did not support the addition of it to the DSME classes. There are other health literacy screening tools available that are tailored specifically to those diagnosed with diabetes, such as the Diabetes Numeracy Test, Composite Health Literacy Scale and Subjective Numeracy Scale, and the Literacy

Assessment for Diabetes (Boston University, 2021). However, for the purpose of the DNP scholarly project, the NVS was chosen due to its increased presence in recent literature, ease of use, validity and short administration time (approximately three minutes), especially when considering it would be administered after a 3.5 hour DSME class and the DNP student wanted to avoid taking up additional time, if able to. Following the scheduled group DSME sessions, each patient meets with the CDE individually, on a different date, to review personal goals, medications, to address any educational deficits, and more. Potentially adding a diabetes-specific health literacy screening tool to the individual DSME sessions could be of benefit to the CDE, due to the ability of having more one-on-one time to spend with the patient to complete the screening tool. This could be done at the first one-on-one visit with the CDE to determine a statistical and validated baseline for the patient in regard to their health literacy level and educational needs moving forward. The screening tool could also be administered by the patient's primary care provider after the decision for diabetic education referral is made and prior to the patient attending the group DSME classes.

Research shows that assessing health literacy levels, using statistically validated screening tools, is important in order to fully understand the needs of the patient being screened (Centers for Disease Control & Prevention [CDC], 2019c). Although the NVS may not be a great fit for the DSME classes at the CHCSEK, there is likely a more suitable screening tool that would still add value to the DSME sessions and to the CDE's educational strategy. It is essential to point out the importance of the CDE continuing to adhere to body language and facial cues, especially when presenting education to

patients, as this is one of the intervention strategies that has been shown to improve health literacy levels in individuals (Ingram & Kautz, 2018).

Observations

There were several general observations noted through the course of the DNP scholarly project. Small class sizes were noted, which drastically affected the ability of the project to report statistically significant data. The DSME classes took place over the course of a 3.5-hour session, which appeared to give ample time for the participants to work through the information, engage with the CDE, ask questions and receive extra assistance from the CDE if needed. The small class size, albeit a limitation to the project, did allow for more one-on-one time with each participant and the CDE, undoubtedly allowing for a better understanding of the information presented to them. Although the NVS had been previously validated, it was noted that this may not be the best screening tool to use for health literacy level assessment in patients attending the DSME classes specifically. It was considered that a health literacy screening tool, specific to the diabetic population, might be more insightful and useful to the CDE, as this would also give the CDE more information regarding where the patient stands in regard to diabetes specific knowledge, versus generalities that could be noted with the NVS. Often, research has shown that healthcare providers may often overestimate a patient's health literacy level; however, the CDE reported that they believed most of the patients attending the DSME classes would demonstrate limited health literacy. Although the results of the project were not statistically significant, 50% of the participants scores reflected adequate health literacy levels. This notion may be due to the many years that the CDE has worked in diabetic education and their familiarity and professional relationship with the diabetic

population of rural SEK. It may also be an indication that the NVS is not as accurate in determining a patient's health literacy level in relation to diabetes, as it is to general health literacy levels. Overall, the need for continued diabetes education for the rurally located SEK diabetic individuals was found to be supported, the project would be greatly improved by the ability to utilize a statistically significant sample size and a screening tool specific to those diagnosed with diabetes mellitus.

Evaluation of Theoretical Framework

The framework utilized for the DNP scholarly project was the Interaction Model of Client Health Behavior developed by Cheryl Cox in 1982. Cox's (1982) theory is configured of three main concepts: client singularity, client-professional interaction, and health outcomes. The main purpose of Cox's theory (1982) was to use a client-focused framework, coupled with a productive client-provider interaction, that would essentially result in positive health outcomes for the patient. The theory relates to the project in question by first establishing each participant's client singularity. This was done through the assessment of their personal demographics, along with the understanding that each participant's background, environmental resources, previous healthcare experiences and social influence (all largely aspects of client singularity) could potentially affect their health literacy level. The second concept, the client-professional interaction was recognized by determining each participant's specific health literacy level, using the NVS screening tool, which resulted in an increase in information, decisional control and professional/technical competencies, all aspects of the client-professional interaction. Lastly, the knowledge gained from the project led to a potential avenue for positive health outcomes through a greater understanding of the clinical health status of each

participant (in relation to their identified health literacy level), as well as determining the need for continued diabetic education. This was done by ensuring that healthcare services and continued adherence to the recommended DSME classes would be continued; albeit their continuance was separate from the project. The continuance of DSME classes would essentially lead to improved health outcomes for each participant by increasing their knowledge, allowing them to better utilize and access health care services in the future, and allow for an increase in their ability to personally adhere and understand their diabetic care regimen, all of which are aspects of Cox's (1982) final concept. The theory in question would also be substantially beneficial to a future project that focused on implementing health literacy specific improvement strategies after the identification of health literacy deficits within a population. This would allow for a more in-depth client-professional interaction and greater measurable health outcomes for the participants.

Evaluation of Logic Model

The developed logic model identified all short-term, intermediate and long-term goals for the DNP scholarly project. The short-term goals of the project focused on increasing communication, increasing patient and provider understanding of patient's needs, and increasing awareness regarding the identified health literacy levels of diabetic patients residing in rural SEK. Although the sample size was insignificant, the project was successful in obtaining the health literacy levels of each surveyed participant and was able to utilize the results to determine patient needs moving forward. Intermediate goals included continuing and/or increasing the DSME classes offered at the CHCSEK. The DSME classes will continue; however, this decision was not influenced by the results of the project, as the CHCSEK has a dedicated CDE that is employed to provide

education and additional resources to its diabetic population. The intent of the intermediate goal was instead to provide further evidence for the CHCSEK, in regard to the need for the DSME classes to continue. However, due to the small sample size of the project, the data was not statistically significant or able to provide evidence in this regard. Although, as previously mentioned, any percentage of individuals who are identified as having limited health literacy are at a greater risk for poor health related outcomes. Long-term goals of the project focused on utilizing health literacy screening tools to increase provider awareness of the health literacy levels of the CHCSEK diabetic population, as well as to increase the health literacy levels and health outcomes of their patients. Long-term goals also included providing a basis for future research and data collection. The long-term goals of the project were not fully met, as the CDE indicated that the use of the NVS in screening diabetic patients may not be helpful in improving their health outcomes. However, the project could most definitely be a basis for further research and data collection, especially with the addition of a diabetes-specific health literacy screening tool and the allocation of a larger sample size that would yield statistically significant data.

Limitations

There were several limitations noted to the DNP scholarly project that negatively affected project outcomes. First and foremost, poor attendance rates were noted. According to the CDE this is not an uncommon event in most years. Some patients also attribute their inability to attend the DSME sessions due to the difficulty in secure transportation, even with classes being offered at various CHCSEK clinics across rural SEK. Normally, the later months of the year do see higher no-show rates due to being

around the holidays; however, this was anticipated by ensuring the project was approved to take place from December of 2020 to February of 2021. However, the year of 2020 saw the COVID-19 pandemic, causing massive nationwide shutdowns and unpredictability. According to the CDE, attendance rates for the year of 2020 year, keeping in mind the circumstances surrounding the COVID-19 pandemic, saw 418 patients scheduled for DSME sessions, with 183 completing the class. In a normal year, approximately six group DSME classes are held each month. The DSME classes were not held in March, April or May of 2020, but were back in session while the project was being approved. However, after the first two sessions in December were attended by the DNP student, the remaining DSME sessions were canceled and moved to telephone delivery. Attendance for the two DSME sessions resulted with only four participants attending the first session and two attending the second session. The CDE reported that most sessions, although scheduled for eight or nine, only have one or two participants attend. Transitioning the DSME classes to individual telephone encounters was not suitable for administering the NVS due to the patient being unable to view the nutrition label that is the basis for the screening tool questions. This was a significant limitation to the project and resulted in data that was unable to be deemed statistically significant. Additionally, because of the small sample size, correlations between participant health literacy levels and personal demographics were not able to be computed, thus another limitation to the statistical analysis of the project results. It would be more beneficial to hold data collection over the span of six months to a year, ensuring the project was conducted during the months of greatest participant attendance (possibly spring through summer).

Additional limitations included administering the NVS screening tool after the DSME class was concluded. The decision to do this was made in order to allow those who did not wish to participate in the project to leave after the class was completed. However, the DSME class did cover the nutrition label and specific scenarios presented to the participants were similar, albeit identical to two of the NVS screening tool questions. Due to the prior education regarding the nutritional information, the results from the NVS screening tool may have differed had the tool been administered prior to the start of the DSME class.

The decision to use the NVS screening tool, specifically, was also later seen as a project limitation. After project results were evaluated, it was determined that a diabetes-specific health literacy screening tool may be more beneficial to the surveyed population and their health goals, as well as a better utilization of resources for the CDE. Furthermore, providing the NVS and demographic screening tool in English only was another limitation to the project, which would primarily be seen as a limitation to overall data collection. The fact that the project did not include a health literacy specific intervention was also seen as a limitation to the project. Including a specific project intervention would have allowed for greater participant impact and detailed evidence for improved health outcomes.

Implications for Future Research

The DNP scholarly project revealed great potential for future research. The review of literature reiterated the need for health literacy level assessment, intervention and improvement in order to improve the number of United States citizens that have been identified as having basic or below basic health literacy. Low or limited health literacy

has been tied numerously to poor health outcomes, thus reiterating the importance of continuing to conduct research that focuses on identification and intervention surrounding health literacy level improvement.

For specific project design improvement, utilizing a diabetes-specific screening told would likely be more beneficial to the participants and the CDE of the CHCSEK. Even further, changing the timing of the health literacy screening tool administration, by requiring the primary care provider referring the patient to diabetic education to administer the tool at their appointment with the patient. This would allow the CDE to have a better understanding of the patient's starting point when it comes to their journey with diabetic education. It would also be a valuable tool for the primary care provider, in regard to continuity of care and providing them increased knowledge surrounding the health literacy levels of their diabetic patients. The diabetic health literacy tool could also, instead, be administered by the CDE during their first one-on-one session after the group DSME class. Regardless of administration time or specific facilitator, the ability to collect statistical data for diabetic patients would give the CHCSEK a valid way to apply for future funding and assistance in continuing, increasing frequency, and/or improving the DSME classes they provide.

The goal of future projects should, however, delve further and focus on health literacy level assessment and specific health literacy level intervention. There are many different studies that have determined ways to increase and improve health literacy levels. Focusing on providing further evidence behind specific intervention strategies would be beneficial to all health care providers and organizations. Future projects could focus on other patient populations as well, such as those with cardiovascular disease,

pediatric or geriatric individuals, and more. Overall, utilizing specific health literacy screening tools and later providing health literacy level intervention strategies would allow for an actual change project to be conducted that could be the basis for diabetes education, or other specialty-based health education in the future.

Implications for Practice, Health Policy and Education

The results of the project indicated the need for health literacy level assessment and continued diabetic education in the rural SEK community. Although the project data was insignificant to support the use of the NVS screening tool, the use of a diabetes-specific health literacy screening tool may provide more information and useable data. Additionally, changes to nursing practice may include the use of the diabetes-specific health literacy screening tool by the patient's primary care provider prior to their referral to diabetes education. Even further, it may be beneficial to screen all the diabetic patients of the CHCSEK with the diabetes-specific health literacy screening tool at their primary care provider's office to ensure the provider is aware of the potential deficits the patient may have, which could in turn systematically trigger or indicate the need for diabetes education referral. The ability of providing cohesive and continued care from the primary care provider to the diabetic educator allows for a streamlined approach to health literacy level deficit identification and improvement within the diabetic population. The assessment of all diabetic patients after their diagnosis or initial primary care provider appointment would ensure those who scores indicated limited health literacy are readily referred to diabetes education. This may show data that supports the need for DSME classes that are offered more frequently and may potentially employ more than one CDE for the rural SEK area allowing for a greater outreach. The introduction of additional

health literacy education to nursing education would ensure that both bachelor, master and doctor prepared nurse graduates are more aware and proactive in regard to health literacy level identification and improvement and what that means for them as a bedside nurse, nurse educator, advanced practice nurse, and more.

Overall, continued health literacy level assessment and intervention is relevant and affects those in practice, health policy and education. In response to the extreme need for health literacy level improvement, the Healthy People 2030 (2020) has developed clinical practice guidelines and initiatives that focus on the identification and improvement of health literacy levels of all persons in the United States. The nationwide focus on this topic reiterates its importance and the importance of healthcare providers being aware of their patient's health literacy levels. The first step in improving any situation is through the assessment and the identification of a deficit. Health literacy level improvement is applicable to providers, as well as those in nursing education and health policy. The cumulative effort is what will essentially reap change in our healthcare system and for our patients, diabetic and others.

Conclusion

The purpose of the DNP scholarly project was to determine the health literacy levels and demographic profile of the prediabetic, type one diabetic, or type two diabetic individuals who attended the DSME classes led by the CDE of the CHCSEK. Secondary goals included determining if the results of the project suggested support for continued diabetic education and the addition of the NVS screening tool to the DSME classes. The goal of the project was to allow for an increased provider awareness in regard to each

patient's health literacy level, as well as to potentially allow for increased evidence surrounding the need for continued diabetic education in the rural SEK area.

Although a small sample size did not allow for statistically significant data, it was concluded that the project data provided evidence for the continued need for health literacy level assessment in individuals with diabetes, as well as the need for continued DSME classes for the patients residing in rural SEK. The addition of the NVS screening tool to the DSME classes was, however, not supported. It was noted that the use of a more precise, diabetes-specific, health literacy screening tool may be more beneficial. Additionally, removing the administration of the health literacy screening tool from the DSME classes and moving it to a one-on-one session with either the patient's primary care provider or the CDE may be of greater assistance in health literacy level identification and indication of the need for further diabetic education or referral for the patient.

The results of the project, and proposed project design changes, support the importance of understanding the health literacy levels and needs of the diabetic patients residing in rural SEK. Consequently, they provide further evidence on the importance of continuing the DSME classes for the diabetic community. This is essential in order to potentially decrease the many barriers to care that rural individuals face.

As health literacy screening tools are incorporated into more and more facilities and programs, it will allow for the continued awareness of each patient's health literacy level and increase the chance that their needs are identified and met. The DNP student is hopeful that incorporating health literacy screening tools into regular practice and policy will only improve awareness, support and a push for change.

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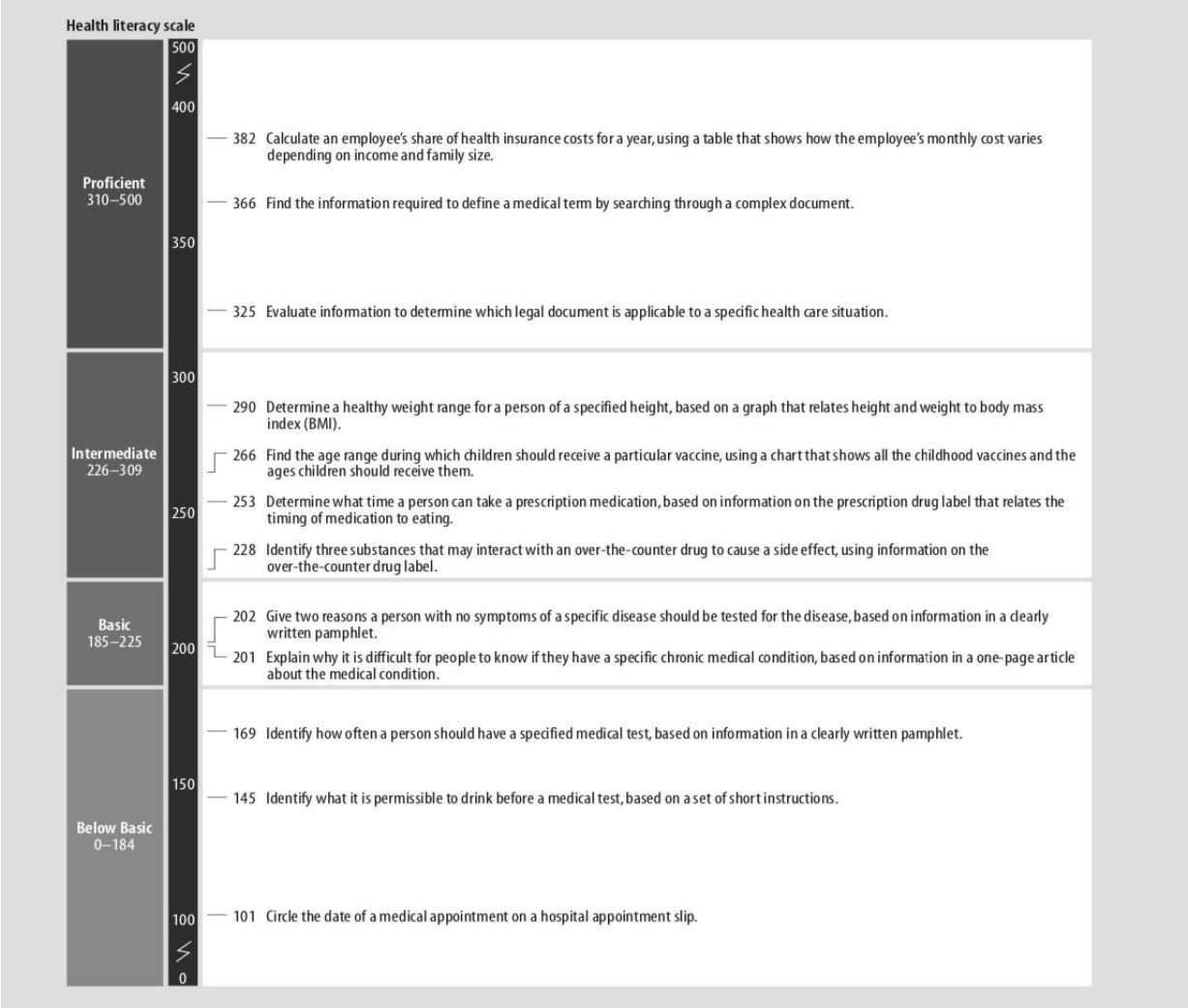
APPENDIX

Appendix A
National Assessment of Adult Literacy Health Literacy Level Scale



Reprinted from "*The Health Literacy of America's Adults: Results from the 2003 National Assessment of Adult Literacy*" by Kutner et al., (2006). Institute of Education Sciences. https://nces.ed.gov/pubs2006/2006483.pdf

Appendix B
Irene Ransom Bradley School of Nursing IRB Faculty Approval

Meghan Murray IRB Faculty Project Approval Form

Meghan presented her project proposal to her committee Via Zoom on Friday, November 13th. She is available by e-mail at meghan.murray@gus.pittstate.edu if any of the committee needs more information before giving their IRB approval for the project.

FYI- Needs at least 7 votes to be approved (quorum)

Faculty	Approve	Need more information	Comments or any changes recommended to the completed form.
Harris, Jennifer			
Johnson, Karen			
Alonza, Manda			
Hite, Amy	A. Hite		Email Approval
Heter, Ashleigh			
Larery, Trina			
McClaskey, Bardie			
Frisbee, Kristi			
Schiefelbein, Jan	J. Schiefelbein		Email Approval
Giefer, Cheryl			
Gena Coomes	G. Coomes		Email Approval
Tracy Stahl			

Appendix C
Pittsburg State University Application for IRB Approval

Pittsburg State University
Application for Approval of Investigations
Involving the Use of Human Subjects

This application must be completed by the Investigator and sent to the Academic Affairs by the first Tuesday of the month during the fall and spring academic semesters to be considered for full review on the second Tuesday of the month.

Expedited and exempt reviews can be turned in any time. For questions about the review process contact Cindy Johnson at 620-235-4175 or at irb@pittstate.edu.

1. Investigator(s) Name(s): Meghan Murray
2. Department: Department of Nursing
3. Local Address: 209 E Adams St, Apt B, Pittsburg, KS 66762
4. Phone: (620)-344-0503
5. E-Mail Address: meghan.murray@gus.pittstate.edu
6. Project Title: Assessing the Health Literacy Levels of Diabetic Patients located in Rural Southeast K
7. Expected Completion Date: February 2021
8. Expected Starting Date: November 2020
9. Application review type. Use review criteria in Form CR-1 to determine category. Check all that apply.

☐ Full Review	☐ Protocol Change	☑ Thesis/Special Investigation/DNP Scholarl Project
☐ Expedited Review	☐ Continued Review	☐ Faculty Research
☑ Exempt Review	☐ External Support	☑ Publish Research
☐ A Class Project	☐ Research in Foreign Country	

10. If notification of human subject approval is required give date required: N/A
    Name of agency: N/A
11. If you are a student, complete the following:
    Faculty Sponsor: Ashleigh Heter
    Department: Department of Nursing
    Phone: (620)-235-4439

When submitting to an external IRB, a full copy of that application must be submitted to the PSU IRB as well.

CERTIFICATION AND APPROVAL

Certification by Investigator: I certify that (a) the information presented in this application is accurate, (b)only the procedures approved by the IRB will be used in this project, (c)modifications to this project will be submitted for approval prior to use, and that all guidelines outlined in the PSU Policy and Assurance Handbook for the Protection of Human Research Subjects will be followed as well as all applicable federal, state and local laws regarding the protection of human subjects in research as outlined in Form VA-1.

Signature of Investigator _____ Date 11/15/20

Faculty Sponsor: If the Investigator is a student, his/her Faculty Sponsor must approve this application. I certify that this project is under my direct supervision and that I accept the responsibility for ensuring that all provisions of approval are met by the investigator.

Signature of Faculty Sponsor _____ Date 11-20-2020

Department Review Committee Chair: I acknowledge that this research is in keeping with the standards set by our department, university, state and federal agencies and I assure that the student principal investigator has met all departmental requirements for review and approval of this research.

Signature of Department Review committee Chairperson _____ Date 11-20-2020

Institutional Review Board Chairperson _____ Date 11/30/2020

I. Description of the Subjects (If advertising for subjects, include a copy of the proposed advertisement.)

A. How many subjects will be involved? Dependent on session turn out; likely 10-20 subjects

B. Subject Population (check all that apply):

☑ Adults ☐ Prisoners ☐ Minors ☐ Intellectual Disability

☐ Physically Ill ☐ Disabled ☐ Special Education

☐ Other (explain): Diabetic Patients & Diabetic Educator of CHCSEK

C. For projects conducted in schools or school settings, written approval from the School Administrator must be obtained. Please attach to end of this application.

What grade are the students in? N/A

Approximate Age of Students? N/A

How many classes involved? N/A

What subject: (secondary)? N/A

Appendix D
Community Health Center of Southeast Kansas Project Approval

Pittsburg State University IRB
Pittsburg State University
Irene Ransom Bradley School of Nursing
1701 S. Broadway
Pittsburg, Kansas 66762

To Whom It May Concern,

Meghan Murray has provided a copy of her project proposal to be conducted at the Community Health Center of Southeast Kansas.

The proposal has undergone review by Risk Management, Legal Counsel, Clinical Leadership, and Clinical Education and been approved to move forward.

We do ask that a copy of the results of the project be provided to Clinical Education for file.

Sincerely,

Reta Baker, BSN, MPH
VP of Clinical Education
Community Health Center of Southeast Kansas
3015 N. Michigan
Pittsburg, Kansas 66762

www.chcsek.org

Appendix E
The Administered Newest Vital Sign Survey

Newest Vital Sign

Nutrition Facts	
Serving Size	½ cup
Servings per container	4
Amount per serving	
Calories 250	Fat Cal 120
	%DV
Total Fat 13g	20%
Sat Fat 9g	40%
Cholesterol 28mg	12%
Sodium 55mg	2%
Total Carbohydrate 30g	12%
Dietary Fiber 2g	
Sugars 23g	
Protein 4g	8%

*Percentage Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Ingredients: Cream, Skim Milk, Liquid Sugar, Water, Egg Yolks, Brown Sugar, Milkfat, Peanut Oil, Sugar, Butter, Salt, Carrageenan, Vanilla Extract.

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

   _____

2. If you are allowed to eat 60 grams of carbohydrates as a snack, how much ice cream could you have?

   _____

3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42g 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?

   _____

4. 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?

   _____

Pretend you are allergic to penicillin, peanuts, latex gloves and bee stings.

5. Is it safe for you to eat this ice cream?

   _____

6. Why or why not?

   _____

Appendix F
The Administered Demographic Survey

Please answer the following demographic questions. Please note that no personal identifying information will be collected and all answers will be kept completely confidential. None of the responses you provide will be connected back to you.

1. Age (in years): _____

2. Gender (select one):
    a. Female
    b. Male
    c. Nonbinary
    d. Other (specify) _____
    e. Prefer not to respond _____

3. Which of the following best describes your racial/ethnic identity? (Select all that apply)
    a. African American or Black
    b. American Indian or Alaskan Native
    c. Asian or Pacific Islander
    d. Hispanic or Latino
    e. White or Caucasian
    f. Other (specify) _____

4. Have you been you diagnosed with Prediabetes, Type One (I) Diabetes or Type Two (II) Diabetes?
    a. Prediabetic
    b. Type One Diabetes
    c. Type Two Diabetes
    d. Unsure

5. What is your highest level of education?
    a. Less than High School
    b. High School Graduate
    c. Vocational Training/Technical School
    d. Some College
    e. Bachelor's Degree
    f. Advanced Degree

6. Which of the following describes who you receive healthcare insurance from?
    a. Public Insurance (Medicare, Medicaid, other public)
    b. Private Insurance (Employer sponsored, Individual Plans, Exchanges)
    c. Uninsured
    d. Other (specify) _____

Appendix G
The Administered Diabetic Educator Questionnaire

Diabetic Educator Questionnaire

Question 1:

What are your credentials?

_____

Question 2:

How long have you worked in diabetic education?

_____

Question 3:

How long have you been a certified diabetic educator? What certification exam did you take?

_____

Question 4:

In your opinion, what health literacy (HL) level would you assume the majority of your patients might fall in to (limited health literacy, adequate health literacy, proficient health literacy)?

_____

Question 5:

Do you believe that adding the Newest Vital Sign (NVS) to the Diabetic Self-Management Education sessions would increase your awareness of each participant's HL level and their personal educational needs moving forward? How would you use their NVS results specifically? Please explain.

_____

_____

_____

Question 6:

Do you believe that there is a continued need for diabetic education within the rural Southeast Kansas community? Please explain.

_____

_____

_____

Question 7:

In as much detail as you can, discuss how you, or the future diabetic educator of CHCSEK, could potentially use the NVS to tailor the needs of DM patients and how it would influence clinical practice change.

_____

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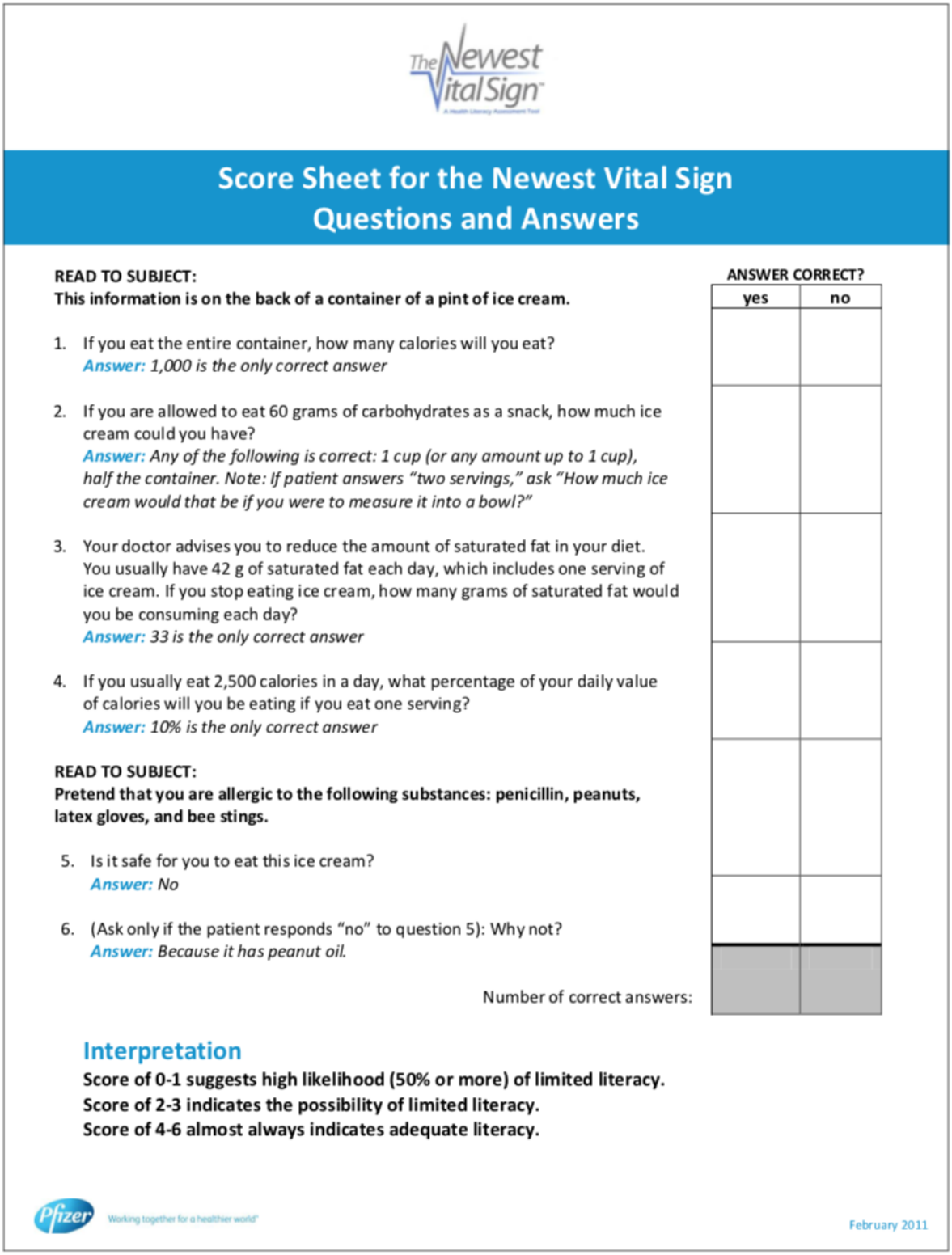
Appendix H
The Score Sheet for the Newest Vital Sign Questions and Answers



The Newest Vital Sign™
A Health Literacy Assessment Tool

Score Sheet for the Newest Vital Sign Questions and Answers

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

	ANSWER CORRECT?	
	yes	no
1. If you eat the entire container, how many calories will you eat? *Answer: 1,000 is the only correct answer*		
2. 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?"*		
3. 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*		
4. 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*		
READ TO SUBJECT: **Pretend that you are allergic to the following substances: penicillin, peanuts, latex gloves, and bee stings.**		
5. Is it safe for you to eat this ice cream? *Answer: No*		
6. (Ask only if the patient responds "no" to question 5): Why not? *Answer: Because it has peanut oil.*		
Number of correct answers:		

Interpretation

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.

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Appendix I
Responses to the Diabetic Educator Questionnaire

Diabetic Educator Questionnaire

Question 1:

What are your credentials?

- RN, BSN, CDE

Question 2:

How long have you worked in diabetic education?

- 12 years

Question 3:

How long have you been a certified diabetic educator? What certification exam did you take?

- 8 years

Question 4:

In your opinion, what health literacy (HL) level would you assume the majority of your patients might fall in to (limited health literacy, adequate health literacy, proficient health literacy)?

- Limited health literacy

Question 5:

Do you believe that adding the Newest Vital Sign (NVS) to the Diabetic Self-Management Education sessions would increase your awareness of each participant's HL level and their personal educational needs moving forward? How would you use their NVS results specifically? Please explain.

- I felt like the assessment tool used in this demonstration was actually too difficult for many of my patients. I personally do not feel this specific tool is effective or adequate to determine literacy inadequacies. I am in constant assessment during my time with patients doing little tests and questions during my education presentation to give me an indication as to how to present to this specific group and how to help them understand if I see that they are not. I do feel very strongly that as so many appointments are changing to phone visits during this time of pandemic, that that would make it even more difficult to determine HL as I find it very important to be able to watch people's expressions and body language to help me determine if they are understanding the materials presented.

Question 6:

Do you believe that there is a continued need for diabetic education within the rural Southeast Kansas community? Please explain.

- Yes. There are many, many diabetics as well as even more pre-diabetics in this area. If we had more education, maybe we could help prevent or at least delay the onset of the disease in those that do not have it yet. And if people understood what happens in their bodies when they have uncontrolled blood sugars, it might help them maintain better control. Teaching people in a way they can understand, not making it too difficult or unattainable, this too, is so important.

Question 7:

In as much detail as you can, discuss how you, or the future diabetic educator of CHCSEK, could potentially use the NVS to tailor the needs of DM patients and how it would influence clinical practice change.

- I would need to see options NVS offered as far as testing tools as well as evidence they present from their studies before I would be convinced this would help in determining HL. To me, with my patients, I can see it might cause frustration. I teach a lot about the food label, and I would prefer to tweak it more towards what is needed to help them function as a diabetic.