EVALUATION OF HEALTH LITERACY AS A PREDICTOR OF THE NEED FOR ADDITIONAL MEDICAL CARE

by
Cameron Elgin Carlton

A Doctoral Scholarly Project submitted to the faculty of
The University of North Carolina at Charlotte
in partial fulfillment of the requirements for
the degree of Doctor of Nursing Practice

Charlotte

2016

Approved by:

____

Dr. Maren Coffman, PhD, RN, CNE

____

Dr. Kathleen Jordan, DNP, MS, RN,
FNP-BC, ENP-BC, SANE-P

____

Dr. Olugbemiga E. Jegede, MD

____

Dr. Henry L. Harris, PhD

____

Kathryn Foster, MSN, RN

ABSTRACT

CAMERON ELGIN CARLTON. Evaluation of health literacy as a predictor of the need for additional medical care (under the direction of Dr. MAUREN J. COFFMAN)

Background

In the current healthcare environment, health care providers do not always have the time needed to identify patients that have challenges understanding health related information. In order to improve health outcomes, it is imperative that patients understand the medical information and self-care instructions provided to them by clinicians. The purpose of this study was to utilize the Single Item Literacy Screen (SILS) and the Newest Vital Sign (NVS) to identify participants with limited reading ability and/or low health literacy in an outpatient primary care clinic and to determine if health literacy level and reading skills predicted higher healthcare utilization.

Methods

Participants receiving care in an out-patient clinic were screened for reading ability and health literacy using the SILS or NVS. Three months later, a medical record review was used to evaluate participant's compliance with attending their scheduled follow-up visits to the out-patient clinic, as well as document unscheduled visits to the emergency department, urgent care, or clinic.

Results

A total of 71 participants were included the final analysis. Although there was not a statistically significant difference in health care utilization based on participant's reading ability and health literacy level, useful information was discovered. Almost two thirds (63.7%) self-reported adequate reading skills while just over half (51.5%) screened for adequate literacy on the NVS. Of the scheduled follow-up visits, 63% were no-shows, and 50% of participants had unplanned, unrelated visits. Last, data suggested that patients considered their ability to read and understand health related information at a higher level than was self-reported.

Discussion

Research suggests that participant's with low health literacy may not use health care services appropriately because they struggle to navigate the system and do not understand health information. Patients' need for education, information, and direction regarding effective and efficient use of medical resources is needed to care for the patient in outpatient setting. Additional research is needed utilizing a more diverse population, as well as comparing health care use in participants with low health literacy to those with adequate health literacy.

ACKNOWLEDGEMENTS

I would like to thank Cone Health for the overall support it has provided me in working towards furthering my nursing education. Specifically, I would like to thank Dr. Jegede and Kathryn Foster for their willingness to allow me to perform my project in the Community Health and Wellness Center. In addition, I appreciate the staff that supported my project by enrolling subjects, as well as answering my questions and assisting me with anything necessary.

I would like to thank Dr. Wayne Foster, statistician for this project, for his hard work, dedication and support throughout this process. His calming nature along with his insight and ability to turn statistical information into clear results has been invaluable to making this project a success.

I am grateful to the University of North Carolina at Charlotte School of Nursing for providing me with an opportunity to grow in my professional and educational journey. I would like to personally thank Dr. Maren J. Coffman, Dr. Kathleen Jordan and Dr. Charlene Whitaker-Brown for their support, inspiring words and limitless knowledge throughout the program, and especially with my project. You all have made life long impressions on me as a person, as well as a practitioner. I will carry on what you have taught me throughout my journey as a Doctor in Nursing Practice.

Last, I could not have been successful in my journey if it were not for my loving and supportive husband, Mark, my son, Jacob, my father, Roy and my mother, Sharon. I hope I have made and continue to make you all very proud.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

Background

In the current healthcare environment, hospitals are under intense pressure to transition patients from acute care to outpatient settings, allowing little time for patient education. This may mean that once patients are home, they have minimal knowledge and preparation regarding self-care needs (Cloonan, Wood, & Riley, 2013). All too often, providers in settings including physician offices lack the time, attention, and focus needed to identify patients and families that have challenges understanding health related information (Coleman, Hudson, & Maine, 2013). To improve health outcomes, it is important that patients and their caregivers understand the medical information and self-care instructions given to them by providers.

Increasingly, after an acute illness, outpatient providers must ensure that patients understand complex health care instructions and are able to provide effective self-care. After a patient is hospitalized, costs can be controlled by helping them avoid re-hospitalizations, emergency department visits, and repeated physician office visits. Hospitals are now being penalized by the Centers for Medicare and Medicaid for excessive readmissions within 30-days of hospitalization and are required to meet quality standards. As a result, fewer re-hospitalizations benefits both the facilities through cost savings and the patient who has better health outcomes (Cloonan, Wood, & Riley, 2013).

The purpose of this paper is to present findings from a scholarly project that measured health literacy and revisit rates in an outpatient primary care setting.

Research has shown that patients with chronic diseases who also have low health literacy are at risk for increased use of health care services, decreased use of preventative health care services, and poorer health outcomes (Morris, MacLean, Chew, & Littenberg, 2006). According to the literature, optimal care delivery and positive health outcomes are achieved when the patient is informed, actively involved in their own care, and able to seek, obtain, and understand health information (Morris et al., 2006). In addition, it is the responsibility of the provider to identify patients who lack health literacy, and adapt their teaching approach accordingly. When health literacy is not identified and addressed appropriately, individuals may have decreased knowledge of their diseases and treatments, fewer disease self-management skills, decreased compliance, and are subject to increased rates of medical and medication errors (Mancuso, 2009).

The term health literacy was first published in 1974 during a health education conference discussing health education as a social policy (Mancuso, 2009). Since the term was first introduced, the concept of health literacy and its implications has been widely explored. As a result of ongoing research, the definition of health literacy has evolved. The American Medical Association (1999) defines health literacy as “a constellation of skills, including the ability to perform basic reading and numerical tasks required to function in the health care environment” (p. 553). The World Health Organization (2009) defines health literacy as “the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health”(p.9). A more comprehensive definition that shifts the focus beyond the individual suggests that health literacy is the interaction between the demands of health care systems and the skills of the patient. According to Sorenson et al., “health literacy is linked to literacy and entails people’s knowledge, motivation, and competencies to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during life course” (Sorenson et al., 2012, p. 3). One of the most common definitions found in the literature was “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Jeppesen, Coyle, & Miser, 2009, p. 24).

Problem Statement

In 2003, the National Center for Educational Statistics performed a National Assessment of Adult Literacy (NAAL). This was the first national assessment designed specifically to measure adults’ ability to use literacy skills to read and understand health related information ("Health Literacy Component" 2003). The four levels of literacy identified as a part of the assessment reflected the skills and knowledge needed to function at a particular literacy level of below basic, basic, intermediate, and proficient. Of the participants surveyed, 53% had an intermediate health literacy level, 22% had basic health literacy, and 14% had below basic health literacy. Only 12% scored in the proficient range. Overall, 36% or more than one third of the US population had basic or below basic health literacy skills (Kutner et al., 2006).

Health literacy is the foundation of quality health care and is essential to improve health care outcomes and disease self-management (Institutes of Medicine [IOM], 2004).

The IOM reports that 90 million people lack the health literacy skills needed to understand and act on health care information. Further, only 12% of adults in the US have the health literacy proficiency required to perform complex health tasks (IOM, 2004). As a result, a patient with low literacy is unable to manage their chronic condition and navigate the health care system, and this may result in increased use of medical services, higher mortality rates, engagement in unsafe or inappropriate prescription or over-the-counter medication use, and decreased utilization of preventative health services (IOM, 2004).

In order to deliver quality healthcare, it is imperative that healthcare providers identify their patient's health literacy level. As a result of this assessment, health literacy sensitive teaching techniques can be used to help the patient learn important self-care strategies, understand self-care needs, and serve as their own advocate. Identifying patients at risk for low health literacy could address other issues such as readmissions, medical errors, and repeat outpatient care visits. After healthcare providers have assessed and identified the patient's health literacy level, they must teach the patient in a way they can understand.

Purpose of the Project

The purpose of this study was to utilize the Single Item Literacy Screen (SILS) and the Newest Vital Sign (NVS) to identify participants with limited reading ability and/or low health literacy in an outpatient primary care clinic located in an urban city. Once health literacy was assessed, the participants' healthcare use was audited using medical record review to determine if health literacy level and reading skills predicted higher healthcare use.

Clinical Question

The clinical question that was addressed in this project was whether a participant's health literacy level affected their need for additional medical care for the same clinical problem by a healthcare provider in an outpatient primary care, acute emergency department, or urgent care setting.

Project Objectives

The purpose of this project was to identify participants with low to moderately low health literacy and to assess if there was a need for additional health care for the same clinical problem. Participants who came to the clinic for primary care services were asked to complete the Single Item Literacy Scale (SILS) and/or the Newest Vital Sign (NVS) to assess reading and health literacy level. Three months later, participant's medical records were reviewed to assess their use of additional medical care for the same clinical problem identified on the initial visit.

CHAPTER 2: LITERATURE REVIEW

A comprehensive literature search was conducted utilizing PubMed and CINAHL. Key words utilized in the search were: *health literacy, readmissions, engagement, healthcare professionals, and low health literacy*. The literature review included articles from 1998 to 2016 and was limited to healthcare related journals. Themes identified throughout the process were: cost of hospital readmissions, association between low health literacy and readmissions, patient engagement and health literacy, health care professional's knowledge of health literacy, and effective and accurate screening tools for health literacy.

Hospital readmissions results in billions of dollars spent on health care services in the United States. Many of these readmissions could be prevented by addressing the patient's health literacy needs (Cloonan, et al., 2013). According to the research, low literacy can lead to misunderstanding medical instructions, poorer health status, missed medical appointments, and increased use of hospital services (Arozullah et al., 2005; Baker et al., 1998; Mitchell et al., 2012). Several studies have examined the effect that lower health literacy has on a patient's ability to seek and obtain follow up care. It has been suggested that important follow up appointments are missed because patients cannot understand or follow health related instructions (Cloonan et al., 2013). Research has shown that patients with inadequate health literacy are twice as likely as patients with adequate health literacy to be hospitalized or require additional health care services (Arozullah et al., 2005; Baker et al., 1998; Mitchell et al., 2012).

There is an association between low health literacy and hospital readmission rates. Mitchell, Sadikova, Jack, and Paasche-Orlow (2012) found that additional medical care for subjects with low health literacy within 30-day of discharge was 95% more likely than those with adequate health literacy. Another study conducted in the emergency department at an urban public hospital found that patients with low health literacy were twice as likely as those with adequate health literacy to be hospitalized within two years of their emergency department visit (Baker, Parker, Williams, & Clark, 1998).

As a part of its laws and purpose, the Affordable Care Act included a provision that patients must be involved in their own health care; that engagement often relies on a person's health literacy skills (Koh, Brach, Harris, & Parchman, 2013). In order to engage a patient, the health literacy of the patient must be identified and addressed using providers working within the context of innovative healthcare delivery models. A patient must be able to understand basic health information, as well as process and communicate information. The belief is that health care should be structured so that interactions between health care professionals and the patient are productive and successful. This could be accomplished by knowledgeable, expert health care teams taking the time and resources necessary to partner with an informed and active patient that is engaged in their own care (Koh, et al., 2013).

Only 12% of adults in the US are capable of completing tasks that are essential to successfully navigating the health care system and acting on their health information (Koh, et al., 2013). Uninformed patients are less likely to utilize preventative care and manage their conditions adequately, which can lead to unnecessary hospitalizations or visits to the emergency department. Health care professionals may make the assumption that the patient understands their disease process and self-care needs, and health care systems often function as if all patients have adequate health literacy and are capable of advocating for themselves (Koh, et al., 2013).

In a 2009 IOM roundtable, health literacy was determined to include both the individual's skills and abilities, as well as the demands and complexity of the health care system (Koh, et al., 2013). In the past, health care professionals considered patient non-adherence, increased hospitalizations, and suboptimal outcomes as the patient's problem and choice. Current research and experience suggests that patients who require rehospitalizations and repeated out-patient visits may have been given the information needed to manage their needs at home, however they were unable to understand the information provided. For many patients, there is a gap between information provided orally and in writing by health care professionals and what the patient can understand (Koh, et al., 2012).

Opinions regarding the most effective tool for assessing health literacy vary. A common assumption is that a person's education level and/or ability to read define their health literacy level, which is false (Dickens, Lambert, Cromwell, & Piano, 2013; Jeppesen et al., 2009; Morris et al., 2006). The majority of adults in the US have an average reading level between the eighth and ninth grade, regardless of their educational preparation (Parker, 2000). Reading, writing, and computational skills are a better measurement of functional ability than number of years of formal education. Last, literacy experts have found that a person's literacy skills are context and setting specific, meaning a person may have adequate literacy in a controlled environment but their literacy level may change if stressed or learning a new concept (Parker, 2000).

Conceptual Framework

There are a number of conceptual frameworks available for health literacy. The framework utilized by Sorenson et al. (2012) encompasses the main aspects of health literacy, as well as a logical model showing proximal and distal factors that impact health literacy while showing pathways that link health literacy with health outcomes (Appendix A). The core of the model includes four competencies related to the process of accessing, understanding, appraising, and applying health related information. Accessing refers to the ability to seek and find health information. Understanding refers to the ability to comprehend the health information. Appraising refers to the ability to interpret, judge, and evaluate the health information. Last, application refers to the ability to communicate and use information to make a decision to maintain and improve health (Sorenson et al., 2012).

The second part of the framework consists of three domains of the health continuum. The first domain is being ill or taking on the patient role in the healthcare setting. The second domain is a person at risk for disease and/or disease prevention. The third domain is related to health promotion. Finally, the framework addresses antecedents and consequences of health literacy (Sorenson et al., 2012). The model does not consider the evolving definition of health literacy or the competencies and knowledge a patient brings to the table. In addition, the framework does not acknowledge the fluidity of the process of learning and ability to gain new information and experiences.

Specific to this project, the model provides a framework from which the health care provider can refer in order to clarify and solidify the impact of health literacy on the patient as well as their practice. When partnering with the patient in their care, the health care professional must consider the social and environmental determinants as well as the situational and personal determinants. In other words, a patients living situation, education level, health and financial status and personal beliefs must be considered when caring for the patient. Next, the health care professional must assess the patient’s ability to access, understand, appraise, and apply health information that is provided. Additional considerations regarding this step are the patient’s knowledge, competence, and motivation. A necessary step in assessing these would include a health literacy assessment and providing educational information to the patient in a way that they will understand. Last, the health care professional must consider and assure the patients understanding and engagement in their own disease prevention and health promotion.

CHAPTER 3: METHODOLOGY

Setting

The Cone Health Community Health and Wellness Center is a community health clinic located in an urban area in Greensboro, NC. The Community Health and Wellness Center provides onsite medical care, pharmacy with medication assistance, and behavioral health and counseling services to approximately 8,500 uninsured and underinsured patients per year. During the past fiscal year, the clinic had 8,254 visits with an average of 27 patient visits per day. The payer mix for the patient population was 6.4% Medicare, 19% Medicaid, 14% commercial insurance, and 1.4% other. The largest population cared for by the clinic is uninsured at 40%. The ethnicity of the patient population is 75% African American, 20% Hispanic, and 5% Caucasian.

The clinic is staffed with one practice administrator, three physicians and advanced practice providers, two nurses, four clinic support staff, six front office staff, one pharmacist, three pharmacy assistants, and one social worker. The pharmacy is the most utilized service. There are approximately 8,500 prescriptions filled per year, an average of 70.4 per day.

Cone Health created this community clinic in order to better serve this patient population. Risk factors for this patient population include lack of knowledge and understanding of information taught to them regarding self-care and follow up, limited resources such as financial and transportation support, etc., and poor follow-up care.

Addressing health literacy and providing patient specific education can positively impact the outcomes, self-care, and decrease unnecessary repeat visits to the emergency department and clinic (Baker et al, 1998; Mitchell et al, 2012).

Institutional Review Board (IRB) approval was obtained from Cone Health and the University of North Carolina at Charlotte. Prior to beginning data collection, training was provided to all of the clinic staff regarding the project purpose and objectives. In addition, the physicians, physician extenders, nurses, and certified medical assistants, received standardized education on screening for limited health literacy consisting of an in person presentation, practice session administering health literacy measures to mock patients, and observing the first screening conducted by the project coordinator.

Tools and Measures

The SILS is a simple instrument designed to identify patients who need assistance with reading health related material. (Jeppesen et al., 2009; Mancuso, 2009; Morris et al., 2006). There is one question on the SILS (Appendix B) and it asks “How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?” Possible responses are 1-Never, 2-Rarely, 3-Sometimes, 4-Often, and 5-Always. Scores greater than two were considered positive, indicating some difficulty with reading printed health related material (Morris et al., 2006).

The purpose of the Single Item Literacy Scale (SILS) is to measure the functional health literacy of the patients in health care settings in English or Spanish. Specifically, the SILS identifies patients with limited reading ability who need help reading health-related materials. The sensitivity of the SILS in detecting limited reading ability is 54% [95% CI: 47%, 61%] and the specificity was 83% [95% CI: 81%, 86%] with an area under the Receiver Operating Characteristics (ROC) curve of 0.73 [95% CI: 0.69, 0.78] (Morris et al., 2006). The cutoff of > 3 was chosen to capture participants that indicated they typically need help with reading written material.

The Newest Vital Sign (NVS) is a tool designed to quickly assess a patient's health literacy skills. It can be administered in English or Spanish. The patient is given a specially designed ice cream label to review (Appendix C) and is asked a series of questions about the label. When administering the NVS, the participant is given a copy of the ice cream label, and is then asked to answer 6 questions. The questions require both reading and mathematical skills.

One point is given for each item that is answered correctly for a possible score ranging from 0 to 6. Scores from 0 to 3 indicate limited literacy (Weiss et al., 2005) and a score > 4 indicates adequate health literacy. Internal consistency of the NVS is good (Cronbach $\alpha = 0.76$), as was the criterion validity when compared to other literacy measures ($r = 0.59$, $p < .001$). The ROC curve for the NVS showed that a score of < 2 had a sensitivity of 72% and specificity of 87% for predicting limited literacy. A score of < 4 had a sensitivity of 100% and a specificity of 64% (Weiss et al., 2005).

Participants

Participants were enrolled into the project from August 2015 through October 2015 using a convenience sample of patients from the Cone Health Community Health and Wellness Center. All patients presenting to the clinic between the hours of 9am and 5pm, Monday through Friday were eligible to participate. Exclusion criteria included participants who could not speak English or Spanish, were less than 18 years of age, those with dementia, too ill to participate, and those with altered mental status. Participants were invited to participate when they registered for their clinic appointment. After the participant entered a private exam room, a trained staff member or project coordinator described the project. Each participant read the consent form, was given an opportunity to ask questions, and signed the consent if they agreed to participate in the project. For Spanish speaking participants a certified, trained interpreter was present and interpreted all research in formation, including the consent form. The Newest Vital Sign was provided to participants in Spanish.

The participants were then asked to complete a survey that assessed their age, race, ethnicity, years of education, and health insurance status. In addition to the self-reported information, the staff or project coordinator recorded the participant's medical record number for use in tracking additional visits, as well as the purpose for the visit. A total of 38 participants completed the SILS and the remaining 33 participants completed both the SILS and the NVS. All data were collected using a paper data collection tool (Appendix B) and were entered into a database by the project coordinator. All project related information, including informed consents and the data tool were kept in a locked box in the nurse's station until retrieved by the project coordinator.

Three months after participants were enrolled, the project coordinator reviewed each participant's medical record through the Cone Health electronic medical record using the participant's medical record number. For each participant the chart was reviewed to identify the reason for the initial visit and that was compared to the participant's self-report of their reason for visit. Next, the chart was reviewed to see if there were any follow-up visits scheduled and when those visits were scheduled. The chart was then assessed for any visits within the three months following the initial visit, as well as the reason for those visits. A comparison was completed regarding the time frame for the scheduled follow-up visit and any visits made to Cone Health including the clinic, emergency department and urgent care to verify if the participant returned for their follow-up visit, as well as to assess if they had any additional visits and the reason for those visits. Medical record review was included in the consent and privacy guidelines were followed to assure confidentiality of all the participants.

Data Analysis

Data were entered into a database utilizing Social Science Statistics 22 Standard GradPack (SPSS). Demographic data was reported utilizing descriptive statistics, percentages, means and ranges, and was utilized to describe the characteristics of the participants. SILS scores were compared at threshold > 3 and the Newest Vital Sign were compared at a threshold of < 3.

To examine repeat visits during the three months' time frame the Mantel-Haenszel chi-square test was performed to see if there is an ordinal association between health literacy and emergency department, urgent care, or clinic visits for the same reason as the initial visit, as well as for unrelated reasons. Significance was based on a p-value ≤ 0.05.

CHAPTER 4: RESULTS

Project Findings

A total number of 71 participants were included in the final analysis. Table 1 shows the demographic breakdown for the entire sample. The mean age was 48.87 years (*SD* = 12.11 years) with a minimum age of 20 and a maximum age of 73.

Table 1: Demographics of sample by race/ethnicity, educational level and health insurance type.

		Educational Level				Health Insurance Type			
Race/Ethnicity	n(%)	K-5	6-8	9-12	>12	Private	Medicare	Medicaid	None
Caucasian	22(31)	0	0	16	6	4	4	2	12
African American	37(52.1)	0	1	28	8	2	5	9	21
Hispanic	8(11.3)	1	2	5	0	0	0	0	8
Asian	2(2.8)	0	1	1	0	0	0	1	1
Other	2(2.8)	0	0	1	1	0	0	1	1
Aggregate %	100	1	6	72	21	8	13	18	61
Aggregate N	71	1	4	51	15	6	9	13	43

The greatest number of individuals were in the “no insurance” category (*n* = 43). The remaining individuals were spread throughout the three other insurance options. These final three were collapsed into a single category comprised of individuals with some form of health insurance. Analyses were conducted to determine if these comprised unique groupings relative to their scores on the SILS and the NVS measures. Table 2 shows the racial/ethnic and educational distribution of the "insurance" versus "no insurance" groups.

Table 2: Racial/ethnic and educational distribution of participants (number and percent) with or without healthcare insurance. (N = 71)

	Ethnicity					Educational Level Grade Level Complete			
Group	Caucasian	African American	Hispanic	Asian	Other	K-5	6-8	9-12	>12
Insurance	10 (34.5)	16 (55.2)	1 (3.4)	1 (3.4)	1 (3.4)	0 (0)	2 (6.9)	21 (72.4)	6 (20.7)
No Insurance	12 (28.6)	21 (50)	7 (16.7)	1 (2.4)	1 (2.4)	1 (2.4)	2 (4.8)	30 (71.4)	9 (21.4)

A chi-square analysis was performed to determine if there was a significant difference between the two groups (i.e., insured versus uninsured) with regard to racial/ethnic composition or educational level. The *a priori* level of significance for this (and all other analyses) was $\alpha = .05$. The distribution for race/ethnicity was not significantly different ($\chi^2 = 2.88$ (4)). The distribution for educational level was also not significantly different ($\chi^2 = .914$ (3)). The mean age for those with some form of insurance was 48.5 years and it was 49.1 years for those without. An independent samples t-test for age was not significant ($t = .224$, $df = 68$).

A t-test was also performed on the SILS score for these two groups. The mean SILS score for the insured group was 1.93 (*SD* = 1.03) and for the non-insured group it was 2.02 (*SD* = 1.16). The results showed no significant difference between the two groups ($t = .347$, $df = 69$). A Levene test revealed homogeneity of variance. In all other t-tests reported in this study homogeneity of variance was assumed unless otherwise reported.

A final analysis was performed to determine if any subgroups existed within the larger sample. The Caucasian and African American participants comprised the two largest racial/ethnic groups. The sample size of the remaining racial/ethnic groups was too small for a meaningful analysis. A t-test was performed to determine if these two groups differed by age, educational level or whether they had (or did not have) medical insurance of some type. All three tests were found to be non-significant. T-tests for age resulted in $t = 1.74$, $df = 56$, for insurance $t = 1.15$, $df = 57$ and for educational level $t = .68$, $df = 57$. Since these potential groups did not significantly differ, the remainder of the analysis is based on the entire sample.

The SILS score indicated how many of the participants needed assistance to read instructions, pamphlets, and other written materials from the provider or pharmacy. The original scale was coded from “1” (never needing assistance) to “5” (always needing assistance). A score of 0-3 on the NVS indicated low literacy and 4 to 6 suggested adequate literacy. In order to conceptually compare these instruments, the SILS was reverse coded so that a lower score indicated low literacy and a higher score equated to a higher level of literacy. Table 3 provides the descriptive statistics for the two scales.

Table 3: Descriptive statistics for the SILS and Newest Vital Sign Tools

	N	Minimum	Maximum	% with Adequate Literacy
SILS (reverse code)	71	1	5	64.8%
Newest Vital Sign	33	0	6	51.5%

The NVS was added later in the data collection process and only the final 33 participants had scores for both instruments. A correlational analysis to clarify the relationship between the SILS and NVS could not be performed because neither scale exhibited a normal distribution. Both scales had distributions that were skewed towards higher levels of literacy for the medical information provided in written format. On the SILS, 64.8% of the participants reported that they rarely or never required assistance reading and interpreting the written information. A more appropriate comparison is with the 33 participants who were administered both the SILS and NVS. Though these scores should be reasonably similar, 64.8% of the patients rated themselves as “never” or “rarely” needing assistance on the SILS and 51.5% scored as having “adequate literacy” on the NVS.

Next, a t-test was conducted to examine the difference between adequate and low literacy on the SILS and NVS. The “adequate literacy” group had a mean score of 3.94 (*SD* = .9) on the NVS and the “low literacy” group had a mean score of 3.75 (*SD* = .94) on the NVS. The means testing for these two groups was $t = .60$, $df = 31$ and non-significant. The participants who scored themselves higher on the SILS were not the same participants who scored higher on the NVS. This indicates that participants’ may not be able to or were not willing to successfully self-determine their level of literacy for reading information provided by their physician or pharmacist based on their scores on the NVS.

Table 4: Cross-tab distribution of the participants with scores from NVS and SILS

	SILS low literacy	SILS adequate literacy
NVS low literacy	n= 7 12%	n= 5 15%
NVS adequate literacy	n= 9 27%	n= 12 36%

Table 4 compares participant's scores on the SILS verses the NVS. The SILS is a self-report of the need for help when reading health related material whereas the NVS objectively measures the participant's ability to read, comprehend and perform simple mathematical problems. Seven participants rated their need for help (low literacy) when reading medical information the same as they scored on the NVS (low literacy). Twelve participants rated needing little to no help (adequate literacy) when reading medical information the same as they scored on the NVS (adequate literacy). However, five participants rated themselves as needing little to no help (adequate literacy) when they actually scored as having low literacy on the NVS. Last, nine participants rated themselves as needing help (low literacy) when reading medical information when they actually scored as having adequate literacy on the NVS.

Next, a comparison was completed between those scoring "low" and "adequate" literacy levels on the SILS regarding attending the scheduled follow-up visit to the clinic.

Forty-six participants rated themselves as having adequate literacy on the SILS and 25 rated themselves as having low literacy. The mean number of no-show visits was .6 (*SD* = .58) for both groups; a non-significant finding (*t* = 0, *df* = 69).

Regardless of the follow-up medical plan, patients returned to the clinic for unscheduled follow-up visits that were related to the original diagnosis. The mean number of unplanned but related visits was .26 (*SD* = .77) for the higher literacy group and .20 (*SD* = .50) for the lower literacy group. This difference was t-tested (*t* = .35, *df* = 69) and was non-significant. In summary, all participants, regardless of their self-ratings on literacy, missed follow-up visits at the same rate and came to the clinic for unplanned but related follow-up visits at statistically the same rate. For this sample of patients, the self-rating of literacy did not alter the follow-up visit pattern.

Last, a comparison was completed between those scoring low and adequate literacy levels on the NVS regarding attending the scheduled follow-up visit to the clinic. The no-show rate for the follow-up, planned medical visits did not differ by literacy rating (*t* = .21, *df* = 31) and the rate of unplanned, related medical visits did not differ by literacy group (*t* = .93, *df* = 31).

Table 5: Means test results

Means Test Comparison	t	df	Result
Insured versus uninsured on SILS	0.347	69	>.05
SILS Score: Adequate Literacy Mean Score versus Low Literacy Mean Score	0.6	31	>.05
SILS: Adequate Literacy versus Low Literacy on No Show visits mean	0	69	>.05
SILS: Adequate Literacy versus Low Literacy on Unplanned but Related visits mean	0.35	69	>.05
NVS: Adequate Literacy versus Low Literacy on No Show visits mean	0.21	31	>.05
NVS: Adequate Literacy versus Low Literacy on Unplanned but Related visits mean	0.93	31	>.05

The number of missed initial follow-up medical visits was 70 and the number of unplanned, unrelated from the original diagnosis was 71. On average, each participant missed a planned follow-up visit and returned for an unplanned, unrelated visit contrary to the written medical plan. For this sample of participants the degree of literacy as measured by the SILS and NVS was unrelated to the pattern of attendance at planned or unplanned visits.

CHAPTER 5: PROJECT SIGNIFICANCE

Summary

Overall, there were no significant differences in comparison of the demographic data including health care coverage, race, and educational preparation. There was no indication that an insured verses an uninsured participant had an increased risk of having low health literacy. In addition, there was not a significant difference in the SILS score between those with or without insurance. The results of this study also revealed that other factors such as racial/ethnic grouping, insurance status and educational level did not have a significant impact on how individuals rated themselves on the SILS or scored on the NVS.

The participant's self-report of literacy level (SILS) was compared to a more objective measure of literacy (NVS). The two measures of literacy, based on the results of this study, were assessing somewhat different aspects of literacy. The SILS measures the patient's self-perceptions regarding their ability to read and understand and the NVS required the patient to answer written questions and was therefore, more objective. The difference between the SILS and NVS scores suggest that participants' may not be able to accurately self-determine their level of literacy for reading health related information.

Essentially, 48% of the 33 participants were able to accurately identify their literacy level. Considering that 42% were unable to accurately self-identify their literacy level, health care providers should consider the approach they use to educate their patients. Those that overestimate their ability may verbalize they understand information, not ask questions, and overall misunderstand instructions. Those that estimate their understanding lower than their actual capability reflect those patients that may have a high level of literacy, however the circumstance, stress of the situation, and/or the complexity of the information makes their understanding more difficult and situational.

On average, each participant missed either a scheduled, follow-up appointment and had an unplanned, unrelated visit to either the emergency department, urgent care or Community Health and Wellness Center. The participant's literacy level had no relation to this data, suggesting there were other factors affecting this pattern.

Limitations to this study were half of the participants did not complete the NVS assessment. Of the 71 participants, both the SILS and the NVS were administered to 33, which limited the ability to compare the participants' scores. In addition, the patient population in this particular clinic was limited to one specific socio-economic level (only 6 of 71 participants had insurance), and gender data was not collected, so gender differences could not be assessed.

Significance

Within the core of the Integrated Conceptual Model of Health Literacy (Sorenson, et al., 2012) lies four key competencies of accessing, understanding, appraising and applying health information. It seems clear, through the data from this project, that the participants have good understanding of access to medical care, however in further reflection questions whether this is an accurate and efficient use of the resources exist.

Given the unplanned, unrelated nature of the visits to acute care it would seem that there is opportunity to provide additional education and information regarding seeking medical care in a planned, appropriate manner.

The second domain of the conceptual model includes health care, disease prevention and health promotion. Within the health care portion of the second domain is the patient being ill and taking on the role as a patient in the health care setting. Many of the participants in this project were either treated or admitted and served as patients in the health care system. Education and understanding seemed to be limited in the area of disease prevention and health promotion. With adequate education and instruction those patient's seeking acute medical services for non-acute medical issues such as minor cold symptoms, medication refills and mild pain would have made appointments with the clinic to address their medical issue instead of seeking emergent care.

The Institute of Medicine (2004) cited that a low literacy patients are unable to navigate the health care system and this may result in increased use of medical services and decreased utilization of preventative health services, among other things. More than 63% of scheduled follow-up visits were no-shows and 50% of participants had unplanned, unrelated visits. The participant's inability to navigate the health care system was evident in this project.

Recommendations

Results of this project were inconclusive regarding the increased utilization of health care resources among low literacy patients. In fact, the data showed equal use of resources among those with adequate verses low literacy, as well as a high rate of utilization overall.

Presently, the standard of care for most clinicians is to assume adequate health literacy of the patient and talk and teach to them at that level. Research has shown that clinicians do not accurately identify people with low health literacy and screening tools can be inaccurate (DeWalt et al., 2011).

The Agency for Healthcare Research and Quality (AHRQ) was commissioned to develop a health literacy tool kit to assist clinicians with addressing health literacy universally. Universal precautions for health literacy is considered structuring health care services to minimize risk when information can seem unclear and patients may have difficulty understanding. The purpose of the toolkit is to build upon and adapt existing resources, identify gaps, and create guidance for implementing tools (DeWalt et al., 2011).

Implementation of health literacy universal precautions in the Community Health and Wellness Center would benefit the patients regarding the quality of care, satisfaction, compliance with plan of care and utilization of health care resources. Clinicians will consistently provide information and education at a lower, simplistic level. Added to their practice, will need to be the validation of understanding and comprehension utilizing teach back. Teach Back is a process where the patient is asked to repeat back, in their own words, the information they were taught. The process assures the patient understands allows the clinician to answer any questions or clarify any misunderstandings before the patient goes home (Volandes & Paasche-Orlow, 2007).

Overall, there is limited, if any negative effects of supporting an environment where patient education is a priority and health literacy is addressed in every encounter. Not only will patients with limited literacy benefit, those with adequate literacy will also benefit from clear, simple and concise information. The patient will not only receive the benefit of self-management skills, they will also learn that their health care team cares about their success, overall health and outcomes (Volandes & Paasche-Orlow, 2007).

With the lack of statistically significant results related to unplanned or planned and related (to original diagnosis at initial visit) visits to the emergency department, urgent care or Community Health and Wellness Center, further research will need to be completed. Use of a diverse group of participants would provide more generalizable results. In addition, it was clear that more than low literacy affected the results of this study.

Future research studies need to be completed with a diverse population within a variety of health care settings such as outpatient and acute care. In addition, additional factors must be identified, controlled and measured in order to adequately identify literacy as a determinant of increased health care visits.

REFERENCES

American Medical Association, (1999). Health Literacy: Report of the Council on Scientific Affairs. *JAMA*, *281*, 552-557.

Arozullah, A. M., Lee, S. D., Khan, T., Kurup, S., Ryan, J., Bonner, M., & Yarnold, P. R. (2006). The Roles of Low Literacy and Social Support in Predicting the Preventability of Hospital Admission. *Journal of Internal Medicine*, *21*, 140-145.

Baker, D. W., Parker, R. M., Williams, M. V., & Clark, W. S. (1998). Health Literacy and the Risk of Hospital Admission. *Journal of General Intern Medicine*, *13*, 791-798.

Cloonan, P., Wood, J., & Riley, J. B. (2013). Reducing 30-Day Readmissions. *The Journal of Nursing Administration*, *43*, 382-387. http://dx.doi.org/10.1097/NNA.0b013e31829d6082

Coleman, C. A., Hudson, S., & Maine, L. L. (2013). Health Literacy Practices and Educational Competencies for Health Professionals: A Consensus Project. *Journal of Health Communication*, *18*, 18-102. http://dx.doi.org/10.1080/10810730.2013.829538

DeWalt, D. A., Broucksou, K. A., Hawk, V., Brach, C., Hink, A., Rudd, R., & Callahan, L. (2011). Developing and testing the health literacy universal precautions toolkit. *Nursing Outlook*, 85-94. http://dx.doi.org/10.1016/j.outlook.2010.12.002

Dickens, C., Lambert, B. L., Cromwell, T., & Piano, M. R. (2013). Nurse Overestimation of Patients' Health Literacy. *Journal of Health Communication*, *18*, 62-69.

Health Literacy Component of the 2003 National Assessment of Adult Literacy. (2003). Retrieved from https://nces.ed.gov/naal/fct_hlthliteracy.asp

Institute of Medicine. (2004). *Health literacy: A prescription to end confusion.* Washington, DC; National Academies Press.

Jeppesen, K. M., Coyle, J. D., & Miser, W. F. (2009, January/ February, 2009). Screening Questions to Predict Limited Health Literacy: A Cross-Sectional Project of Patients with Diabetes Mellitus. *Annals of Family Medicine*, *7*(1), 24-31. http://dx.doi.org/10.1370/afm.919

Koh, H. K., Berwick, D. M., Clancy, C. M., Baur, C., Brach, C., Harris, L. M., & Zerhusen, E. G. (2012). New federal policy initiatives to boost health literacy can help the nation move beyond the cycle of costly 'Crisis Care'. *Health Affairs*, *31*(2), 1-8. http://dx.doi.org/10.1377/hlthaff.2011.1169

Koh, H. K., Brach, C., Harris, L. M., & Parchman, M. L. (2013). A proposed 'Health Literate Care Model' would constitute a systems approach to improving patients' engagement in care. *Health Affairs*, *32*(2), 357-366. http://dx.doi.org/10.1377/hlthaff.2012.1205.

Kutner, M., Greenberg, e., Jin, Y., & Paulsen, C. (2006) Literacy in everyday life: Results from a 2003 National Assessment of Adult Literacy. Retrieved February 10, 2016, from https://nces.ed.gov/pubs2006/2006483.pdf

Mancuso, J. M. (2009). Assessment and Measurement of Health Literacy: An Integrative Review of the Literature. *Nursing and Health Sciences*, *11*, 77-89. http://dx.doi.org/10.111/j.1442-2018.2008.00408.x

Mitchell, S. E., Sadikova, E., Jack, B. W., & Paasche-Orlow, M. K. (2012). Health Literacy and 30-Day Postdischarge Hospital Utilization. *Journal of Health Communication*, *17*, 325-338. http://dx.doi.org/10.1080/10810730.2012.715233

Morris, N. S., MacLean, C. D., Chew, L. D., & Littenberg, B. (2006, March 24). The Single Item Literacy Screener: Evaluation of a Brief Instrument to Identify Limited Reading Ability. *BMC Family Practice*, *7*(21), 1-7. http://dx.doi.org/10.1186/1471-2296-7-21

Parker, R. (2000). Health literacy: a challenge for American patients and their health care providers. *Health Promotion International*, *15*(4), 277-283.

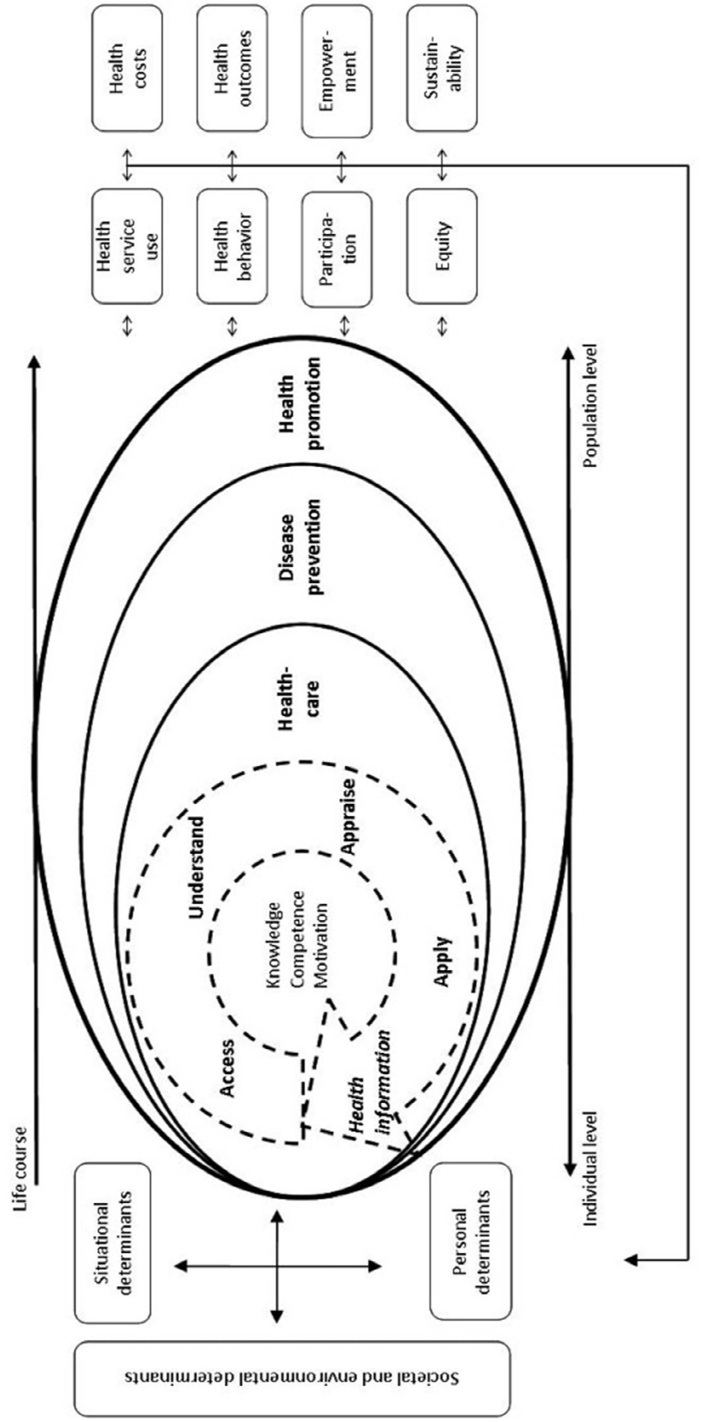
Sorenson, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., & Brand, H. (2012). Health Literacy and Public Health: A Systematic Review and Integration of Definitions and Models. *BioMed Central*, 12(80), 1-13.

Volandes, A. E., & Paasche-Orlow, M. K. (2007). Health Literacy, Health inequality and a just healthcare system. *The American Journal of Bioethics*, *7*(11), 5-10. http://dx.doi.org/10.1080/15265160701638520

Weiss, B. D., Mays, M. Z., Martz, W., Castro, K. M., DeWalt, D. A., Pignone, M. P., Hale, F. A. (2005). Quick assessment of literacy in primary care: The Newest Vital Sign. *Annals of Family Medicine*, *3*(6), 514-522.

World Health Organization. Health Promotion Glossary. 1998.

APPENDIX A: INTEGRATED CONCEPTUAL MODEL OF HEALTH LITERACY



APPENDIX B: DATA COLLECTION TOOL

Health Literacy Screening Study

Today's Date:	**Zip Code:**
Subjects Full Name:	**MRN:**
Age:	

Ethnicity:	Caucasian	African American	Hispanic	Asian	Native American	Other

Insurance: **(Check all that apply)**	Private	Medicare	Medicaid	None

Reason for Visit:

Highest Level of Education Completed	

How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?(Check one)

Never	Rarely	Sometimes	Often	Always

Based on this health literacy assessment, will you modify your approach to this patient's education?

☐ Yes ☐No

Name of Staff Completing Form: ____

Place form in locked box located in nursing station.

If you have any questions or concerns please call project coordinator at the following:

Cameron Carlton
E-mail: cameron.carlton@conehealth.com

APPENDIX B: (continued)

Score Sheet for the Newest Vital Sign
Questions and Answers

READ TO SUBJECT:

Pretend that your friend Mary is allergic to the following substances: Penicillin, peanuts, latex gloves, and bee stings.

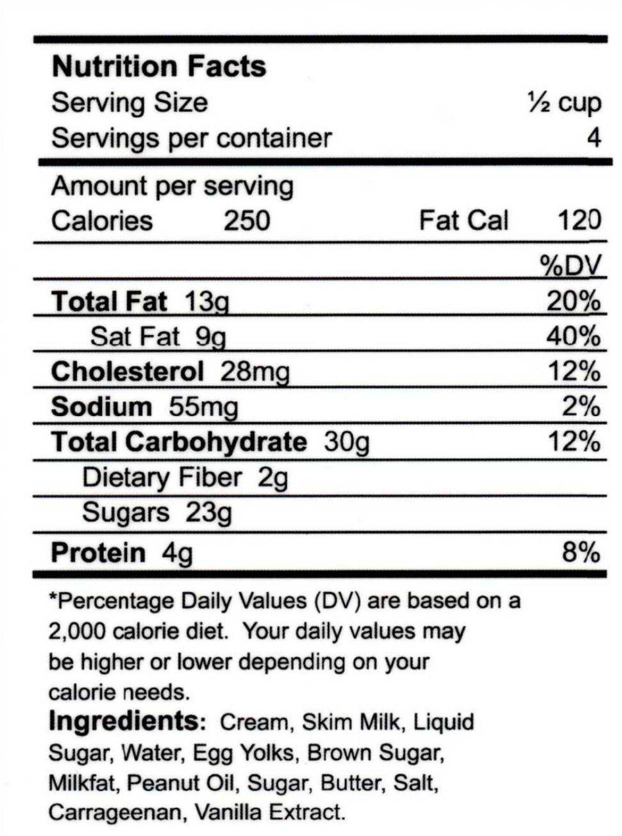
Question	YES	NO
1. Is it safe for Mary to eat this ice cream? *ANSWER: No*		
2. (Ask only if the patient responds "No" to above question). Why not? *ANSWER: Because it has peanut oil in it.*		

READ TO SUBJECT:

This information is on the back of a container of a pint of ice cream.

Question	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 can you have? *ANSWER: Any of the following are correct: any amount up to 1 cup, half the container.*		
3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 grams 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*		
Number of Correct Answers		

APPENDIX C: NEWEST VITAL SIGN ICE CREAM LABEL



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.