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Exploring Health Literacy in the Acute Care Setting in a Rural Border Region

Shiloh Williams
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral dissertation by

Shiloh A. Williams

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Mary Martin, Committee Chairperson, Nursing Faculty
Dr. Leslie Hussey, Committee Member, Nursing Faculty
Dr. Maria Ojeda, University Reviewer, Nursing Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

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Dissertation Submitted in Partial Fulfillment

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Abstract

Health literacy is important to ensuring patients have the necessary knowledge and skills needed to actively participate as a member of their own healthcare team. Patients with low health literacy are at increased risk for poor outcomes and limited participation in decisions affecting their health or treatment plan. Using the Social Ecological Model (SEM) as a framework, the purpose of this study was to determine the relationship between medical-surgical registered nurses, medical-surgical patients and the registered nurse's (RN) assessment of their patient's health literacy of those who live in a rural-border region. The study's sample consisted of 84 pairs of medical-surgical patients who were alert and oriented and had received care from a medical-surgical RN for a minimum of 6 hours. Using correlation and regression testing, the results showed that RNs tend to overestimate their patient's health literacy abilities. It was also noted that in the absence of a health literacy assessment tool, the patient's education level is a significant predictor of their health literacy level. This study contributes to positive social change as it provides additional evidence of health care provider's inability to accurately identify patient health literacy levels in the absence of a standardized assessment tool while also contributing to a better understanding of health literacy in minority populations. Future study could focus on examining other acute settings, such as in the maternal child specialty area or the emergency department and consider the acute status of the patients within the targeted healthcare settings and their ability to participate in the data collection phase of the study

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Dedication

This body of work is dedicated to my husband, Ben, and children, Braylon, Garnet and Easton, who went on the doctoral journey with me. Thank you for your unwavering patience, understanding, and support over the last 3 years.

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I would also like to acknowledge Dr. Helina Hoyt who inspired me to start my doctoral journey. Thank you for reminding me that this journey was a marathon, not a sprint, and that this process is not necessarily about intelligence, but rather patience and persistence. Thank you for your pioneering efforts to advance the nursing profession in a rural-border region!

Finally, I would like to acknowledge and thank my family - my husband and children who endured the journey with me. Ben, thank you for being my cheerleader and my rock. Thank you to my parents, grandparents, siblings and their families for all of the help you have provided my family and I along the way. It takes a tribe to raise a family and I am incredibly thankful for mine. Mom and Dad, I hope I have made you proud!

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Part 1: Overview

Introduction

Low health literacy, commonly characterized as a silent epidemic, is a common factor among patient's inability to adhere to their plan of care (Ingram, 2018). Patients with low health literacy struggle with understanding the complexities of their disease process and their prescribed course of treatment. Health literacy is defined as the ability of the patient to understand basic health information, including common medical terms, and interpret the information to make meaningful informed decisions regarding their health (Ingram, 2018). Therefore, low health literacy is the patient's inability to understand basic health information as it is presented to them and cannot use that information to make informed choices regarding their care (Ingram & Kautz, 2012; Ingram, 2018).

The nurse-patient interaction plays an important role in furthering a patient's knowledge and understanding regarding their health. Registered nurses in the acute care environment are tasked with developing and initiating a patient's educational programming to effectively prepare them for discharge from the hospital. While the nurse has a professional obligation to provide effective education and communication regarding a patient's health, there is no established regulatory or practice requirement that mandates use of an evidence-based tool to assess a patient's health literacy level (Dickens, Lambert, Cromwell & Piano, 2013). While many studies have explored the nurse's familiarity with health literacy and its importance on patient outcomes, few have focused on the ability of the nurse to effectively detect the presence of low health literacy in their

patient population without the use of a standardized assessment tool (Macabasco-O'Connell & Fry-Bowers, 2011).

Background

The concept of health literacy was first introduced in the literature in the mid 1970's with an initial focus on health education and the individual's ability to understand their health (Speros, 2004; Zamora & Clingeman, 2011). Over time the concept of health literacy evolved to incorporate the elements of comprehension and information gathering with a focus on overall health outcomes as a measure of achievement. For purposes of this study health literacy will be defined as the ability of an individual to acquire, understand and utilize health-related information to make decisions regarding their health and healthcare (Speros, 2004; Weld, Padden, Ramsey, Garmon-Bibb, 2008).

Health literacy is divided into two dimensions: functional health literacy and interactive health literacy (Speros, 2004; Dennis et al., 2012). Functional health literacy encompasses basic reading, writing and numeracy skills and strongly correlates with an individual's overall literacy level, including reading and language skills (Bonaccorsi, Lastrucci, Vettori, & Lorini, 2019; Bostock & Steptoe,2012). Interactive health literacy is comprised of cognitive and social skills and is largely concerned with an individual's cognitive abilities, including information processing and memory capabilities (Speros, 2004; Bostock & Steptoe, 2012). In order to effectively understand health-related information, an individual must have adequate skills in both dimensions.

The patient's ability to acquire, assess and utilize basic health information, also known as possessing an adequate level of health literacy, is a core element within the

patient-centered-care model (Zamora & Clingeman, 2011; Altin, Finke, Kautz-Freimuth, & Stock, 2014). Patients with adequate health literacy are also more likely to partake in health-promoting activities, seek preventative treatments and enter the healthcare system earlier when they are ill (Louis et al, 2017). On the contrary, individuals with low health literacy are more likely to struggle with comprehending health-related information, less likely to participate as an active member of their own health care team, report lower levels of self-efficacy and struggle with navigating the United States' complex healthcare system (Harnett, 2017; Krist, Tong, Aycock & Longo, 2017; Louis et al., 2017; Soto Mas & Jacobson, 2019).

Health Literacy – Impact on Patient Care

The Institute of Medicine (IOM) (2004) first highlighted the importance of addressing health literacy as a means for reducing healthcare costs, improving quality of care and eliminating health-related disparities in the United States. Since then, many federally funded programs have focused on developing and implementing strategies to identify and improve health literacy, especially in vulnerable populations (Pop et al, 2011; Altin, Finke, Kautz-Freimuth, & Stock, 2014, Soto Mas & Jacobson, 2019). One such initiative, the National Action Plan to address health literacy developed by the Department of Health and Human Services, focuses on identifying health literacy gaps within populations and funding research aimed at addressing those gaps (Weiss, 2015). Another such initiative was developed by the American Medical Association who funded the development of training materials on identifying and addressing low health literacy in patient populations for clinicians (Weiss 2015). Despite numerous efforts by both federal

and private entities, low health literacy has remained a challenge for the United States' healthcare and public health systems (Weiss, 2015; Soto Mas & Johnson, 2019).

As a part of their professional standard, clinicians are required to provide individualized education to patients on a wide variety of health topics; however, they are not mandated to provide education or offer training materials at an appropriate level that allows the patient to understand the material (Weiss, 2015). The Joint Commission, a healthcare accrediting body encourages staff to practice "universal precautions" when providing education to patients, assuming that all patients have a somewhat limited understanding of their health care, though coming short of requiring use of an evidence-based screening tool (Welch, VanGeest & Caskey, 2011). Without a standardized tool, healthcare professionals tend to overestimate patient's abilities and fail to appropriately detect the presence of low health literacy (Dickens, Lambert, Crowell, & Piana, 2013). With registered nurses composing the largest body of the healthcare workforce and providing the majority of patient care in the hospital, it is imperative they are familiar with the concept of health literacy and have the skills to detect its presence in the patients they serve (Macabasco-O'Connell & Fry Bowers, 2011).

Health Literacy and Minority Populations

Low health literacy is higher in rural and minority communities where factors related to socioeconomic status, limited availability of educational resources, and barriers to health care access are more prevalent (Pop et al, 2011; Sentell & Braun, 2012; Golboni et al., 2018). While the relationship between low health literacy and poor patient outcomes and the relationship between poor patient outcomes and minority populations

have been extensively explored in the literature, researchers are challenged with consistently identifying predictors of low health literacy within minority populations (Garbers et al, 2010; Mas & Jacobson, 2019). For example, Boyas (2013) identified education level as a significant predictor of health literacy level while age, gender, home income, and immigration status were not. Similarly, Galboni et al (2017) found that education status, as well as geographical location, were strong predictors of low health literacy in minorities from both rural and urban settings (Galboni et al, 2017). However, Shaw, Huebner, Armin, Orzech & Vivian (2009) found that limited English proficiency, rather than education level, was a strong predictor of low health literacy in minorities, especially the Hispanic and Latino populations.

Such a wide range of factors make it challenging for researchers to confidently identify traits that can be used by clinicians as potential indicators to deploy health literacy screening tools. In addition, inconsistent use of screening tools and reliance on current knowledge and skill levels of registered nurses place vulnerable populations at even greater risk for adverse care outcomes. Until such a time that a true consensus can be established by the literature, clinicians should effectively screen all patients for the presence of low health literacy to better inform the patient's plan of care (Weld, Padden, Ramsey & Garmon-Bibb, 2008; Harnett, 2017).

Health Literacy Screening Instrument

Health Literacy Screening instruments are available for a wide range of populations and health conditions (Thomason & Mayo, 2015). Selection of an instrument for assessing health literacy should be based upon a well-defined criterion based upon the

needs of the population it will be utilized in. In the fast-paced acute medical-surgical clinical setting, nurses are challenged to complete care tasks and extensive documentation requirements in a timely manner. Limiting the amount of time and resources needed to administer the screening instrument is important to facilitate workflow and lessen the administrative burden placed upon the staff.

The Newest Vital Sign (NVS) is a 6-question screening tool that focuses on the ability of the patient to use their reading, numeracy and comprehension skills to decipher information presented on a simplified ice cream nutrition label (Chan, 2014). The screening tool takes roughly 3 minutes to administer and was found to have a high sensitivity to detect the presence of even marginal health literacy (Ylitalo, et al, 2018). The patient is given a point for every question they answer correctly, with 4 or more questions correct indicating the patient likely has adequate health literacy, 2 to 3 questions correct indicating possibility of limited health literacy and less than 2 indicative of low health literacy (Welch, VanGeest, & Caskey 2011). The (NVS) has been validated in a wide array of clinical areas, including the hospital, and with diverse populations (Welch, VanGeest, & Caskey, 2011; Shealy & Threatt, 2016). The NVS has also been validated in both English and Spanish with overall instrument predictive abilities similar to the Test of Functional Health Literacy, a comprehensive assessment tool strongly considered the gold standard in health literacy assessment (Chan, 2014; Ylitalo et al, 2018).

In addition to its established reliability and validity, the NVS has multiple advantage over other screening tools. The NVS not only has a rapid administration time,

the resources required to administer the screening tool are fairly inexpensive and reproducible at no additional licensing cost to the health care organization (Weiss, 2018). The NVS also assesses both dimensions of health literacy simultaneously, providing a comprehensive assessment of the patient's functional and cognitive abilities (Osborn, et al., 2007). Other tools, such as the Rapid Estimate of Adult Literacy in Medicine (REALM) and the TOFHL, also rely heavily on the patient's ability to read and pronounce words in the English language, placing patients who have a primary language other than English at a distinct disadvantage (Osborn et al., 2007; Chan, 2014; Ylitalo et al., 2018).

The NVS does have potential drawbacks, including the limited ability of the screening instrument to predict future health outcomes (Osborn et al, 2007; Shealy & Threatt, 2016). The use of a nutritional label as the mechanism of assessment also presents a challenge to participants who may be unfamiliar with the nutrition label format in the absence of internationally-recognized labeling standards (Chan, 2014). This limits the application of the instrument across various cultures and geographical regions (Chan, 2014). However, when validated against the Short-Test of Functional Health Literacy (S-TOFHL), a shortened version of the TOFHL, the NVS was able to identify nearly all participants who had inadequate health literacy, thus supporting instrument validity (Osborn et al, 2007). Participants also indicated they had less shameful feelings when reporting the results of the NVS to their healthcare providers as compared to other instruments and favorably supported the use of NVS in routine clinical settings (Singh, Coyne & Wallance, 2015).

Framework

The theoretical base for this study is the Social Ecological Model (SEM). SEM focuses on the relationship and influence between the various factors that comprise the physical and social environments surrounding an individual (McCormack, Thomas, Lewis & Rudd, 2017). The model is divided into 5 separate factors: intrapersonal, interpersonal, institutional, community, and public-policy with intrapersonal involving the patient's demographic, biological and social factors; interpersonal involving the patients formal and informal social networks; institutional involving the healthcare facilities, including their staff, that an individual interacts with; community as it relates to defined geographical location, environmental conditions and social climate; and public-policy as it relates to local state or national laws and regulations (McDaniel, 2018). The presence of and relationship between various factors may directly or indirectly influence an individual's health literacy level (McCormack, Thomas, Lewis & Rudd, 2017).

McCormack, et al. (2017) highlighted the need for additional research to further develop the concept of health literacy, specifically analyzing the influence of unique factors on patients' health literacy levels. This study will particularly focus on the relationship between the patient and nurse's intrapersonal and institutional factors as influences of the patient's predicted or confirmed health literacy level. Intrapersonal factors impacting health literacy are attitudes and beliefs about one's own health as well as literacy and numeracy skills. Inadequate skills or a poor attitude towards their health may lead to poor comprehension and disengagement in their plan of care (McCormack, et al., 2017). Institutional factors related to health literacy include the healthcare

organization, the staff delivering care, and the integration and coordination of the system (McCormack, et al., 2017). The registered nurse, as a component of the institution, can influence a patient's ability to understand their care and make informed decisions through individualized interventions geared towards the patient's deficits. For example, the registered nurse may utilize plain language when communicating with the patient, incorporating visual and auditory learning modalities to meet the patient's unique needs and deliver education if a knowledge deficit is identified.

Overview of the Manuscripts

This study seeks to explore the relationships present between medical-surgical registered nurses, medical-surgical patients and the nurse's assessment of their patient's health literacy level. Each manuscript focuses on a unique relationship between the two populations of interest and the concept of health literacy as viewed through the intrapersonal and institutional components of the Social Ecological Model. The first manuscript serves as a foundation to determine the accuracy of medical-surgical registered nurse's prediction of low health literacy in a rural border region. The second and third manuscript focus on the unique relationships and influence, as identified by the study's theoretical framework, between the concept of health literacy and the targeted populations.

Manuscript 1

Research question. What is the relationship between medical-surgical nurse's assessment of patient's health literacy levels and actual health literacy levels of patients who are hospitalized on a medical-surgical unit and live in a rural border region?

H_0: There is no relationship between medical-surgical nurse's assessment of patient's health literacy levels and actual health literacy levels of patients who are hospitalized on a medical-surgical unit and live in a rural border region.

H_1: There is a relationship between medical-surgical nurse's assessment of patient's health literacy levels and actual health literacy levels of patients who are hospitalized on a medical-surgical unit and live in a rural border region.

Nature of the study. I used a quantitative approach to analyze the accuracy of medical-surgical registered nurse's assessment of patient's health literacy levels as compared to the patient's actual health literacy level as measured by a standardized health literacy measurement tool. A Spearman correlation test was performed on the perceived health literacy level of the patient as given by the medical-surgical registered nurse versus the actual score provided by the standardized health literacy measurement tool.

Possible types and sources of data. Data were collected after the registered nurse had interacted with a patient for six or more hours and the nurse had the opportunity to complete the patient's daily assessment. The dependent variable for this study is the nurse's perception of their patient's health literacy level as measured at the ordinal level. The registered nurse was asked to rate their patient's health literacy level on a scale of 0 to 6, with 0 being not adequate and 6 being adequate. The independent variable for this study was the patient's actual health literacy level as assessed using the NVS. The NVS assigned each patient a score 0 to 6 based upon the tool's scoring rubric. This data was collected and measured at the ordinal level.

Possible analytical strategies. Data were collected, organized and analyzed using SPSS version 25 software. A Spearman correlation model was used to examine the strength of the relationship between the patient's actual health literacy level and the registered nurse's perception of the patient's health literacy level.

Other information. I contacted the IRB during the development of the prospectus to determine what additional steps would be needed while working with a potentially vulnerable population deemed to have low health literacy and/or potentially being identified as a person who utilizes English as a second language. I utilized available translation resources, including a validated copy of the tool translated into Spanish and English-to-Spanish interpretation services to obtain consent and administer the survey to patients who had indicated Spanish as their primary language. For those patients who identified a language besides English or Spanish as their primary language, I would have utilized the appropriate interpretation services to obtain consent and administer the survey, though no patients identified a primary language other than English or Spanish during the data collection phase of the study. The IRB reviewed the premise document associated with the prospective study and determined that no further action was required at this time. Other potential barriers that may have hindered the study were the potential for participants to opt out of the study due to distrust of studies identified as *research* as well as an in-depth data collection process. This is secondary to cultural norms as well as potential perceptions of immigration status issues on the part of the patient.

Manuscript 2

Research question. What is the relationship between demographic factors (*years of experience, highest degree level obtained, familiarity with concept of health literacy* using a 5-point Likert scale with 1 representative of the nurse's report of not being familiar at all with the concept of health literacy and 5 indicating the nurse's report of being very familiar with the concept of health literacy) of registered nurses who work in a medical-surgical unit and the health literacy level of patients who are hospitalized on a medical-surgical unit in a rural border region?

H_0: There is no relationship between demographic factors (years of experience, highest degree level obtained, familiarity with concept of health literacy) of registered nurses who work in a medical-surgical unit and the health literacy level of patients who are hospitalized on a medical-surgical unit in a rural border region.

H_1: There is a relationship between demographic factors (years of experience, highest degree level obtained, familiarity with concept of health literacy) of registered nurses who work in a medical-surgical unit and the health literacy level of patients who are hospitalized on a medical-surgical unit in a rural border region.

Nature of the study. I used ordinal regression model to analyze the strength of the relationship between the accuracy of the registered nurse in predicting their patient's health literacy level and nurse-specific characteristics including years of experience, highest degree level obtained and familiarity with the concept of health literacy.

Possible types and sources of data. Data were collected at the ordinal level, including years of experience, highest degree level obtained, and familiarity with the

concept of health literacy, from registered nurses who work on a medical-surgical unit and whose patients were included in the study. Each nurse's unique data was coded to ensure anonymity but also facilitate the determination of predictor variables that may result in a more accurate predicted health literacy level assessment.

Possible analytical strategies. Data were collected, organized and analyzed using SPSS version 25software. A nominal regression model was used to determine the relationship between the nurse's characteristic data and their accuracy in predicting their patient's health literacy level.

Manuscript 3

Research question. What is the relationship among demographic factors (age, ethnicity, highest level of school completed, gender and primary language) and the health literacy level in patients who are hospitalized on a medical-surgical unit who live in a rural-border region?

H_0: There is no relationship between demographic factors (age, ethnicity, highest level of school completed, gender and primary language) and the health literacy level of patients who are hospitalized on a medical-surgical unit who live in a rural border region.

H_1: There is a relationship between demographic factors (age, ethnicity, highest level of school completed, gender and primary language) and the health literacy level of patients who are hospitalized on a medical-surgical unit who live in a rural border region.

Nature of the study. A quantitative approach was used to analyze the relationship between patient-specific variables and their health literacy level in medical-surgical patients in a rural border region.

Possible types and sources of data. Participant demographics were collected using a survey format. Each participant's unique data were coded to ensure anonymity and allow the researcher to identify and compare what demographics are significant predictors health literacy levels in patients who live in a rural border region.

Possible analytical strategies. Data were collected, organized and analyzed using SPSS version 25 software. An ordinal regression was used to analyze the relationship between the patient's demographic data and the health literacy level of medical-surgical patients in a rural border region.

Significance

Medical-surgical registered nurses providing patient care in the acute care setting are tasked with educating patients about their acute illness and overall health at a time when the patient is often stressed and overwhelmed by their healthcare encounter. The nurse has a professional obligation to ensure the patient understands the plan of care and possesses the necessary knowledge and tools to continue their care once they have been discharged home. However, the ability of the nurse to provide effective education and communication is often hindered by the practice environment, including time consuming indirect patient care tasks and nursing staff shortages. Mackie, Marshall, and Mitchell (2017) found that nurses often provided education to patients in few sittings, with information flowing in one direction. Mackie et al. (2017) noted that nurses tended to communicate with patients and their caregivers using medical jargon and rarely checked for understanding or encouraged questions. This traditional method of education may be further challenged when the patient and caregivers also suffer from low health literacy,

often leading to patient-provider miscommunication, gaps in patient knowledge and overall lack of patient understanding of the plan of care (Cox et al, 2017).

Medical-Surgical registered nurse's understanding of health literacy is important as their ability to identify when patients and caregivers suffer from low health literacy has the potential to significantly impact the patient's plan of care. When patients understand their health and treatment plan, they are more likely to possess and use the necessary knowledge and tools to actively participate in their care (Toback & Clark, 2017). The ability to actively engage in their own care is more likely to lead to improved healthcare outcomes and a reduction in unnecessary readmissions to the hospital and thus promoting positive social change.

Currently, there is no industry regulation to assess for and address a patient's low health literacy level. The Joint Commission (TJC), an organization focused on promoting high quality healthcare and patient safety in healthcare organizations through accreditation and certification, focuses on providing healthcare materials, such as education and consents, in the patient's language of choice to facilitate their understanding of the care they are receive (The Joint Commission [TJC], 2019). However, TJC does not require healthcare organizations to address a patient's health literacy level, despite the literature demonstrating a strong correlation between adequate health literacy level and improved patient outcomes. The Centers for Medicare and Medicaid Services (CMS), a regulatory body that oversees organizations that deliver healthcare services, also does not specifically address a patient's health literacy level. As research continues to focus on the relationship between adequate health literacy and

positive patient outcomes, the hope is that governing and accrediting bodies will implement new requirements for healthcare organizations to adequately assess for and address low health literacy levels in their patient populations and thus promote positive social change through better informed patients taking an active role in their healthcare.

Summary

Health literacy is an important skill needed by patients but there is little in the way of formal programs aimed at identifying and addressing low health literacy within the current healthcare environment. A patient's inability to understand health information presented to them and utilize the information in a meaningful way limits their ability to actively participate in their care. Clinicians are required to provide patients with individualized education about their health but rarely consider whether or not the patient has the necessary skills to comprehend the information (McCormack, Thomas, Lewis & Rudd, 2019). Patients who do not speak English or who's primary language is a language other than English face additional challenges when attempting to understand their care.

Registered nurses who provide care for medical-surgical patient populations are in a prime position to identify patients who have low health literacy and develop a plan of care that addresses the patient's knowledge or skill gap (Dickens & Piano, 2013; Harnett, 2017). Current literature has demonstrated that health care professionals, including registered nurses, tend to overestimate a patient's literacy skills and fail to recognize when signs and symptoms of low health literacy are present (Dickens, Lambert, Cromwell, & Piano, 2013). Use of an evidence-based screening tool, such as the Newest Vital Sign, provides a standardized approach for assessing for and identifying patients

who have low health literacy skills. This study aims to explore the relationships between medical surgical registered nurses, medical-surgical patients and the accuracy of the nurse's assessment of their patient's health literacy level.

Part 2: Manuscripts

Accuracy of Medical-Surgical Nurse's Prediction of Patient's Health Literacy Level

Shiloh A. Williams

Walden University

[Notes]

Outlet for Manuscript

The *Journal of Health Communication* is a peer-reviewed publication focused on advancing research and practice in the area of health communication and marketing (Journal of Health Communications, 2019). The journal focuses on topics that include health literacy, shared decision-making and ethics, social marketing and mass media communications, policy and education as well as both national and international health diplomacy (Journal of Health Communications, 2019). The Journal of Health Communication is located at http://www.tandfonline.com.

The *Journal of Health Communications* requires all papers to be formatted appropriately using standardized templates available on their website and no more than 5000 words in length. Each submission receives an originality report and then is reviewed by the editor against the journal's established criteria. The paper then undergoes a formal double-blind review for publication by independent experts. If accepted for publication, the author is encouraged to make data collected for the study open and accessible via a recognized data repository and include the digital identifier with the final published manuscript

The *Journal of Health Communications* was selected as the outlet for Manuscript 1 due to the journal's focus on advancing the topic of health literacy through the scientific process. The intent of Manuscript 1 is to examine the relationship between health care provider prediction of patient health literacy levels and the patient's actual heath literacy level. This information will likely contribute to the profession's understanding of the registered nurse's accuracy in predicting a given patient's health

literacy level as well as provide for future research on interventions, including the use of standardized tools, that facilitate early identification of low health literacy in patient populations.

Abstract

Low health literacy is common in rural locations where resources are scarce and negative socioeconomic factors are abundant. Registered nurses who provide acute care medical-surgical services in these types of areas are in a prime position to identify low health literacy is present in the patients they are caring for and adjust the patient's plan of care to address knowledge or skills gaps. However, very little time is spent learning about this topic during the registered nurse's academic program. Without formalized training or an industry requirement to utilize a standardized health literacy assessment tool, registered nurses are left to rely on their own knowledge and experience to identify when low health literacy is present in the patients, they provide care for. The purpose of this study was to determine if there was a relationship between medical-surgical nurse's assessment of patient's health literacy levels [as measured by the Newest Vital Sign (NVS)], and actual health literacy levels of patients who hare hospitalized on a medical-surgical unit and live in a rural border region. Data were collected from 84 pairs of RNs and patients after the RN had provided care for the patient for a minimum of 6 hours. Results revealed there was a moderately strong positive correlation of $r_s = 0.418$ at alpha = 0.01, between the registered nurse's prediction of the patient's health literacy level and the actual health literacy level as measured by the NVS. The study further contributes to the growing support for the use of standardized health literacy assessment tools in all settings to accurately identify the presence of low health literacy in patient populations. Recommendations for future study include expanding the current research model to other geographical areas to better understand health literacy in rural-border regions.

Introduction

Health literacy levels are often lower in rural locations challenged with socioeconomic factors and limited health care resources (Golbani et al, 2017). Health literacy is defined as the ability of the patient to understand basic health information, including common medical terms, and interpret the information to make meaningful informed decisions regarding their health (Ingram, 2018). Patients with low health literacy, or lacking the necessary skills to make informed decisions regarding their care, has been identified as a common barrier for patients in the rural border region. Patients often struggle with comprehending health-related information, have limited participation as a member of their own care team, report lower self-efficacy levels and have increased challenges with navigating the complex health care system (Harnett, 2017; Krist, Tong, Aycock & Longo, 2017; Louis et al., 2017; Soto Mas & Jacobson, 2019).

Low health literacy is also associated with poor health outcomes, decreased rates of treatment compliance and increased hospitalization rates (Dickens, Lambert, Cromwell & Piano, 2013; Morris et al, 2011). With an estimated one-third of the population in the United States suffering from low health literacy, it is important for clinicians to not only be familiar with health literacy but also accurately identify when low health literacy is present in their patient population (Kutner, Greenberg, Jin & Paulson, 2006; Morris et al, 2011). Unfortunately, health care clinicians may have limited exposure to the concept of health literacy or may overestimate their patient's health literacy skills (Goggins et al, 2016).

Significance

At the time this manuscript was written, there was no industry regulation to effectively screen patients for low health literacy in the acute care environment. The Joint Commission, a widely recognized health care accrediting body, requires educational information to be given to patients in the language of their choice but does not require education to be presented within the literacy level that would allow them to understand the information. Without an industry or regulatory standard, there is little in the way of support for acute health care organizations to utilize precious time and resources to ensure the patient's health education needs are being met.

The theoretical basis for this study is the Social Ecological Model (SEM). SEM examines the relationships and influence between the physical and social environment and the individual (McCormack, Thomas, Lewis & Rudd, 2017). The model is derived of 5 unique factors, intrapersonal, interpersonal, institutional, community and public policy, and the relationship and influence between them (McDaniel, 2018). This study aims to view the institutional factor that represents the relationship between the patient and the nurse through the health literacy lens. As identified by McCormack, Thomas, Lewis & Rudd (2017), each factor of the SEM may directly and indirectly influence the patient's abilities to understand their health-related information.

While a number of studies have focused on developing effective strategies to address health literacy, very few have focused on identifying the nurse's ability to accurately predict a patient's literacy level based upon standardized medical-surgical patient interactions. This study will affect positive social change by exploring the

relationship between the nurse's predicted patient health literacy level and the actual health literacy level as determined by use of a standardized assessment tool.

Relevant Scholarship

In the acute care medical surgical setting, registered nurses are responsible for providing patients with the majority of their care, including appropriate education (Goggins, Wallston, Mion, Cawthon, & Kripalani, 2016). Studies have shown that education in the acute care environment is wrought with barriers, with patients often receiving standardized educational handouts that resemble a short novel, limited face-to-face interaction with a knowledgeable health care provider in which information is delivered in a rushed manner and often using a one-way communication technique (Goggins et al, 2016; Harnett, 2017). A nurse's ability to accurately predict a patient's health literacy level while they are hospitalized in the acute care environment is important to ensuring the patient has the knowledge and skills required to effectively manage their own health.

One such method for accurately identifying patient's health literacy levels is the use of a standardized assessment tool. The Newest Vital Sign (NVS) is one such tool that is available for use by healthcare organizations at no charge. Its easy-to-use format and rapid administration time of less than 3 minutes makes it an ideal tool for the busy medical-surgical environment. The NVS has also been comparatively analyzed against older standardized health literacy assessment tools and found to achieve similar valid and reliable results. In terms of sensitivity, the NVS was found to appropriately identify limited patient literacy levels correctly 95% of the time (Osborn et al, 2007). The NVS

was also found to perform consistently in a variety of populations and across multiple health care settings (Osborn et al, 2007).

Research Question

What is the relationship between medical-surgical nurse's assessment of patient's health literacy levels and actual health literacy levels of patients who are hospitalized on a medical-surgical unit and live in a rural border region?

The $H_0$1: there is no relationship between medical-surgical nurse's assessment of patient's health literacy levels and actual health literacy levels of patients who are hospitalized on a medical-surgical unit and live in a rural border region.

The H_A1: there is a relationship between medical-surgical nurse's assessment of patient's health literacy levels and actual health literacy levels of patients who are hospitalized on a medical-surgical unit and live in a rural border region.

A quantitative correlational approach was utilized to analyze the relationship between the patient's health literacy level as determined by the standardized assessment tool, the NVS, and the nurse's predication of the patient's health literacy level.

Methods

The target population for this study was registered nurses who work in a rural-border acute care medical-surgical setting who were paired with patients who are alert and oriented and who were receiving ongoing health care in the same setting. In order to be considered for the study, the registered nurse must have provided care for the patient for a minimum of 6 hours prior to the data collection period. This criterion was confirmed by the registered nurse prior to administration of the survey. The 6-hour time period

ensured the patient had received an appropriate head-to-toe assessment by the overseeing nurse as well as undergone standard nurse-patient interactions for the medical-surgical environment, such as medication administration, dressing changes or plan of care reviews. Both the nurse and the patient had to consent to participate in the study. Patients who were identified as having admitting diagnoses as identified by the patient's registered nurse of altered mental status, confusion, dementia, or encephalopathy were excluded from the study.

Sampling and Power

A convenience sample of nurse and patient couples who met the above parameters were deemed eligible to participate in the study. The sample size for this study was determined by conducting an *a priori* power analysis using G*Power software (Faul, Erdfelder, Lang & Buchner, 2017). Assuming a two-tailed test with an alpha of 0.05, effect size of 0.30 and a power of 0.80, the G*Power for a Spearman's correlation statistical test indicates a sample size of 84 paired participants would be needed to assure sufficient power and reduce the likelihood of a type 2 error (Faul, Erdfelder, Lang & Buchner, 2017). Nurses and patients who consented to participation in the study were assigned unique identification numbers that represent their relationship in the study but also secured anonymity amongst the participant pool.

Sources of Data

The independent variable for this study used ordinal level data representative of the patient's health literacy level as determined using the Newest Vital Sign (NVS) health literacy measurement tool. The tool was available in both English and Spanish and did

not require permission from the author to use in research studies (Weiss, 2018). For this study, there were no patients who reported a primary language other than English or Spanish.

Administration of the NVS involved the patient being asked a series of six questions that pertain to a simplified ice cream nutritional label. The patient was given a copy of the nutrition label in their primary language and was asked to provide answers to the questions using their literacy, numeracy and logic skills (Weiss, 2018). For every question the patient answered correctly, they were given a point. For the NVS, the patient was able to obtain a minimum score of zero, indicating they did not answer any of the questions correctly, to six, indicating they answered all questions correctly. According to the NVS, the patient's score is representative of their health literacy level with scores of 0-1 indicating a high likelihood of limited literacy, scores 2-3 indicating the possibility of limited literacy and scores of 4-6 indicating the patient likely has adequate literacy. The patient's score was recorded on the data collection sheet after the assessment had been administered.

The dependent variable for this study was ordinal level data representative of the nurse's prediction of their patient's literacy level. The nurse's predicted patient literacy level was collected by asking the nurse to rate their patient's health literacy level on a scale of zero to six, with zero representative of the patient lacking literacy skills and six representative of a patient who has adequate literacy skills. The nurse's assessment number was recorded on the data collection sheet.

The NVS has been utilized in a number of studies and has a Cronbach's alpha of 0.76 (Osborn et al, 2007). The NVS has also been validated in both English and Spanish-speaking patients with good sensitivity and moderate specificity (Welch, VanGeest & Caskey, 2011). In 2018, Weiss released an article that provided in-depth training on proper administration of the NVS to further support instrument reliability. The procedure outlined by Weiss was used to administer the NVS to the sample population in this study.

Design and Analysis

The cross-sectional correlation study utilized a Spearman correlation model to examine the strength of the relationship between the patient's actual health literacy level and the nurse's prediction of the patient's health literacy level.

Results

Execution

The study was executed as planned with data collected from 84 pairs of RNs and patients in the medical surgical environment. Patients who met the inclusion criteria were identified by the medical-surgical floor charge nurse and inclusion criteria was confirmed by the patient's registered nurse. The registered nurse was consented for the study prior to collecting data from the patient. The patient was consented for the study and data collected at the patient's bedside. Data were then collected from the patient's registered nurse. There was no missing data in the final data set from the study.

Results

The model was examined to ensure all assumptions of the Spearman Rho test were met. The data set included all variables operationalized at the ordinal level of

measurement, with matched pairs of monotonic data. Analysis of the sample size, N=84, revealed there was a moderately strong positive correlation of $r_s = 0.418$ at alpha = 0.01, between the registered nurse's prediction of the patient's health literacy level and the actual health literacy level as measured by the NVS (Table 1.1). Therefore, the null hypothesis was rejected. Further, it was noted that the mean score of the actual patient health literacy level as determined by the NVS was 1.71 while the mean score of the registered nurse's prediction of the patient's health literacy level was 4.26 (Table 1.2).

Table 1: *Patient Health Literacy Levels: Nurse Prediction versus Actual*

Correlations

			Actual HL Level	Predicted HL Level
Spearman's rho	Actual HL Level	Correlation Coefficient	1.000	.418**
		Sig. (2-tailed)	.	.000
		N	84	84
	Predicted HL Level	Correlation Coefficient	.418**	1.000
		Sig. (2-tailed)	.000	.
		N	84	84

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2: *Mean Comparison for Patient Health Literacy Levels: Nurse Prediction versus Actual*

	N	Minimum	Maximum	Mean	Std. Deviation
Actual HL Level	84	0	6	1.71	1.428
Predicted HL Level	84	0	6	4.26	1.281
Valid N (listwise)	84				

Discussion

Interpretation

Medical-surgical RNs, like other healthcare professionals, tend to overestimate their patient's health literacy abilities as evident by the difference in the mean health literacy level of 2.55 when the actual health literacy level was compared to the RN's predicted patient health literacy level (Table 2). Using the NVS's scoring rubric, this results in patients being classified as having adequate health literacy, when in fact low health literacy is likely. This finding is consistent with another study conducted by Goggins et al (2016) in which health care clinicians were unable to accurately detect low health literacy in their patient populations without the use of a standardized assessment tool.

In terms of SEM's institutional factor, a patient's ability to understand their health-related information may be directly influenced by the nurse's ability to detect the presence of low health literacy. This study has demonstrated that nurses tend to overestimate their patient's health literacy levels and thus would fail to recognize when low health literacy may be a barrier to patient-centered care. This failure could result in patients not making truly informed decisions regarding their health and treatment and thus could limit their abilities to experience good outcomes (Morris et al, 2011).

Limitations

The study did have some limitations. First, the sample was taken from a single rural-border region located in Southern California, thus limiting its generalizability to

other rural-border regions located in the United States. Secondly, at the time the data was collected, the healthcare organizations were experiencing a higher volume that typically occurs during the Winter months. To meet the demand for nursing care, healthcare organizations often supplement their department staffing with agency nurses to support the higher patient volumes. During this peak time, staffing could swell by as much as 50% with staff that are not as familiar with the patient population or the local dialect, leading to an inappropriate nurse assessment of a patient's health literacy abilities.

Implications

The medical-surgical RN's inability to accurately predict their patient's health literacy level is troubling, especially when patients who are admitted to the medical-surgical environment are often experiencing new diagnoses or are unable to successfully manage their chronic conditions. If registered nurses are unable to correctly identify when patients may be suffering from low health literacy, they will miss a critical opportunity to adjust the patient's plan of care and address gaps in the patient's knowledge or skills (Kutner, Greenberg, Jin & Paulson, 2006). This could potentially lead to poor patient outcomes and the patient experiencing the "revolving door" phenomenon of health care (Morris et al, 2011; Dickens, Lambert, Cromwell & Piano, 2013).

In terms of positive social change, the results of the study also contribute to a growing body of evidence that healthcare professionals are not able to accurately identify their patient's health literacy level in the absence of a standardized health literacy assessment tool (Goggins et al, 2016). The hope is that the current standard of care will

be elevated by industry regulatory agencies to mandate the use of a standardized health literacy assessment tool to screen for low health literacy in the medical-surgical population (Goggins et al, 2016). This requirement would further support the SEM's institutional influence as patients with low health literacy would be appropriately identified and receive the additional educational support they require.

Recommendations

Recommendations for future study include expanding the current research model to encompass other rural-border areas to further support the generalizability of the study's findings as well as examining other acute settings, such as in the maternal child specialty area or the emergency department. Future researchers should consider the acute status of the patients within the target healthcare settings and their ability to participate in the data collection phase of the study.

Conclusion

This study has reinforced the fact that healthcare professionals struggle to accurately identify patient's health literacy levels in the absence of a standardized health literacy assessment tool. In terms of the study's influence on positive social change, healthcare providers in all settings must recognize when barriers to good patient outcomes and patient engagement are present and work to mitigate those barriers. Through the implementation and use of a standardized health literacy assessment tool, healthcare providers can better support the patient's needs and identify when additional health education resources should be deployed to support positive patient health outcomes.

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Medical-Surgical Nurses' Demographics Effect on Predicting Patients' Health Literacy Levels

Shiloh A. Williams

Walden University

[Notes]

Outlet for Manuscript

MEDSURG Nursing is a peer-reviewed journal produced and published by the Academy of Medical-Surgical Nurses (AMSN). The journal seeks to advance medical-surgical nursing practice through manuscripts that highlight research, professional development and evidence-based practice on wide array of topics, including continuous quality improvement, nursing management and pharmacology, evidence-based interventions, ethics and law, and the nurse as Educators. The journal can be located at http://www.medsurgnursing.net.

MEDSURG Nursing has specific guidelines for submitting a quantitative research manuscript. The manuscript must be formatted according to the Publication Manual for the American Psychological Association and conform to all requirements as outlined in *MEDSURG Nursing's* Guidelines for Qualitative Research Manuscripts (MEDSURG Nursing, 2018). The manuscript cannot exceed a length of 15 pages or 3,750 words excluding tables and reference lists (MEDSURG Nursing, 2018).

The research study proposed in Manuscript 2 aligns with *MEDSURG Nursing's* desire to expand the practice of medical-surgical registered nurses by exploring the relationship of medical-surgical nurse's characteristics with their ability to predict a patient's health literacy level in the absence of standardized health literacy assessment tools. The study seeks to identify characteristics of nurses that could predict whether or not a nurse is able to accurately detect the presence of low health literacy in their patient population. This information would inform the nursing body of knowledge and support

further studies to identify appropriate interventions to enhance nursing knowledge and understanding as it pertains to patient health literacy.

Abstract

Medical-surgical registered nurses play a critical role in ensuring patients have the necessary knowledge and skills to participate as active members of their own healthcare team. Unfortunately, there is very little focus on the role of health literacy during the registered nurse's academic preparation and very little guidance available once they are practicing in the clinical environment. Registered nurses are left to their own knowledge and experience to determine whether or not low health literacy is present in their patient population. This study sought to explore the relationship between a rural-border acute medical-surgical registered nurse's demographics and their ability to accurately predict their patient's health literacy level without the use of a standardized health literacy assessment tool. Data were collected on 59 pairs of medical-surgical registered nurses (RNs) and patients who the RNs had provided care to for at least 6 hours. Results showed that RNs were unable to accurately identify their patient's health literacy level. Further, their years of experience, academic preparation and their familiarity with the concept of health literacy did not directly relate to their ability to accurately predict their patient's health literacy level. Use of a standardized tool to identify low health literacy in the medical-surgical patient population is important to ensuring patients have the ability to actively participate as a member of their own healthcare team.

Introduction

Registered nurses play a critical role in preparing patients with the knowledge and skills required to actively participate in their plan of care. In the medical-surgical acute care environment, registered nurses are challenged with educating patients when they are at their most vulnerable state, acutely ill and often diagnosed with a new illness or condition. The medical-surgical nurse's ability to accurately identify patients who have low or inadequate health literacy is imperative to ensuring they have the necessary knowledge and skills needed to safely discharge from the facility and continue managing their own care (Dickens, Lambert, Cromwell & Piano, 2013; Polster, 2018).

Health literacy is defined as the ability of the patient to understand basic health information, including common medical jargon, and use the information to make meaningful informed decisions regarding their healthcare (Ingram, 2018). Patients with low health literacy, or lacking the necessary skills to make informed decisions regarding their care, has been identified as a common barrier, especially for patients in a rural border region or who have English as a secondary language. Patients with low health literacy often have difficulty with keeping appointments, administering their medications and have increased challenges with navigating the health care system (Harnett, 2017; Krist, Tong, Aycock & Longo, 2017; Louis et al., 2017; Soto Mas & Jacobson, 2019).

Significance

Registered nurses have limited exposure to the concept of health literacy during their academic preparation and are ill-prepared to address low health literacy once they are practicing in the clinical environment (Macabsco-O'Connell & Fry-Bowers, 2011).

Vague understanding of the concept of health literacy and its impact on patient outcomes further hinders nurses from recognizing and intervening when low health literacy may be present in their patient populations (Macabasco-O'Connell & Fry-Bowers, 2011). McCormack, Thomas, Lewis & Rudd (2017) highlighted the need to further study the concept of health literacy and the unique influence healthcare providers have on patient health literacy.

Using the Social Ecological Model (SEM) as a theoretical framework, this study seeks to explore the relationship and influence of the institutional factors on patient health literacy. One of five unique factors that comprise the model, the institutional factor encompasses the organization, the staff of the organization responsible for delivering care, and the overall integration and coordination of the system (McDaniel, 2018). By exploring the demographics of the nursing staff in the acute care medical-surgical environment, this study can affect positive social change through better identification of the unique demographics that lead to more accurate predictions of patient's health literacy levels. This information will be helpful to future researchers as it not only explores what factors contribute to improved nursing assessment of health literacy levels, but can support positive social change by informing industry leaders of the knowledge and skills required by health care providers to identify the presence of low health literacy in their patient population.

Relevant Scholarship

Healthcare professionals tend to grossly overestimate their patient literacy skills and fail to recognize signs that indicate the presence of low health literacy (Dickens,

2013). Furthermore, much of the current research regarding healthcare provider's abilities to detect low health literacy has been performed in the outpatient setting where patients seek preventative and follow-up care for their healthcare conditions (Macabasco-O'Connell & Fry-Bowers, 2011; Harnett, 2017). Engaging health care providers in the recognition of low health literacy in their patient population is crucial to ensuring adequate interventions are implemented as a standard component of the patient's plan of care (Harnett, 2017).

Healthcare provider training programs, such as medical and nursing schools, have limited if any curriculum devoted to the concept of health literacy (Macabasco-O'Connell & Fry Bowers, 2011; Dickens, 2013). In the acute care environment, the registered nurse is responsible for coordinating the patient's care amongst all members of the healthcare team, spending several hours throughout their shift interacting with the patient and their family members. The registered nurse in the medical-surgical environment is also tasked with ensuring the patient has received appropriate education regarding their disease or condition and that they are well-equipped to handle their care upon their discharge out of the hospital (Ingram & Kautz, 2018). If registered nurses are not being given the necessary skills required to effectively assess for and address low health literacy during their initial training nor given the opportunity to develop those skills as a part of their clinical practice, they may be ill prepared to identify when health literacy is not adequate in the patients they serve (Macabasco-O'Connell & Fry-Bowers, 2011).

It is well understood that as healthcare providers, including registered nurses, practice in the clinical environment, their knowledge and skill about common diseases or

issues in the population they care for increases. Over time, the registered nurse develops keen clinical intuition that provides a foundation to support future clinical decision-making. It is hypothesized that factors, such as years of experience, higher degree levels, age, familiarity with the concept of health literacy or experience as a minority individual would provide the registered nurse with increased awareness of health literacy challenges in the patients they care for; however, no specific studies could be located.

Research Question

RQ: What is the relationship between demographic factors (years of experience, highest degree level obtained, and familiarity with concept of health literacy) of registered nurses who work in a medical-surgical unit and the health literacy level of patients who are hospitalized on a medical-surgical unit in a rural border region?

H_0: There is no relationship between demographic factors (years of experience, highest degree level obtained, and familiarity with concept of health literacy) of registered nurses who work in a medical-surgical unit and the health literacy level of patients who are hospitalized on a medical-surgical unit in a rural border region.

H_A: There is a relationship between demographic factors (years of experience, highest degree level obtained, and familiarity with concept of health literacy) of registered nurses who work in a medical-surgical unit and the health literacy level of patients who are hospitalized on a medical-surgical unit in a rural border region.

Methods

The target population for this study was registered nurses who work in a rural-border acute care medical-surgical setting who were paired with patients who are alert

and oriented and receiving ongoing health care in the same setting. In order to be considered for the study, the registered nurse had to have provided care for the patient for a minimum of six hours prior to the data collection period. This six-hour window ensured the patient had received an appropriate head-to-toe assessment by the overseeing nurse as well as undergone standard nurse-patient interactions typical of the medical-surgical environment, such as medication administration, dressing changes or plan of care reviews. This criterion was confirmed by the patient's registered nurse prior to obtaining consent and required that both the nurse and the patient consented to participation in the study. Patients who were identified as having admitting diagnoses of altered mental status, confusion, dementia, or encephalopathy as identified by the patients registered nurse were excluded from the study.

Data were collected using the Newest Vital Sign (NVS), a validated health literacy assessment tool. The NVS has been validated in both English and Spanish and does not require special permission from the author to utilize in research studies (Weiss, 2018). Patients who indicate Spanish as their primary language received a Spanish version of the tool for data collection purposes and consent was obtained through the use of a language interpretation resource. During the study, all participants identified their primary language as either English or Spanish.

Sampling and Power

A convenience sample of nurse and patient couplets who met the above parameters were deemed eligible to participate in the study. The sample size for this study was determined by conducting an *a priori* power analysis using G*Power software

(Faul, Erdfelder, Lang & Buchner, 2017). Assuming an alpha of 0.05, effect size of 0.20 and a power of 0.80, the G*Power for a logistic regression analysis indicated a sample size of 59 paired participants would be needed to assure sufficient power and reduce the likelihood of a type 2 error (Faul, Erdfelder, Lang & Buchner, 2017). Nurses and patients who consented to participation in the study were assigned unique identification numbers that represent their relationship in the study but also secured anonymity amongst the participant pool.

Design and Analysis

The cross-sectional correlation study utilized a logistic regression model to examine the strength of the relationship between the registered nurse's characteristics and their ability to accurately predict patient health literacy levels. The independent variables for this study were the registered nurse characteristics, including the nurse's reported *years of experience, highest degree level obtained* and *familiarity with the concept of health literacy*. The variable *years of experience* was measured at the ordinal level, with potential responses of "0-1 years," "2-3 years," "4-7 years," and "8 or more years." The variable *highest degree level obtain*ed was measured at the ordinal level, with potential responses of "Associate Degree," "Bachelor's Degree," "Master's Degree.," and "Doctoral degree." The variable familiarity with the concept of health literacy was measured at the ordinal level using a 5-point Likert scale with 1 representative of the nurse's report of not being familiar at all with the concept of health literacy and 5 indicating the nurse's report of being very familiar with the concept of health literacy.

The dependent variable for this study examined the nurse's accuracy in predicting the patient's health literacy level. This variable was measured at the nominal level with "yes" representative of the nurse accurately predicting their patient's health literacy level and "no" representative of the nurse incorrectly identifying the patient's health literacy level. The nurse's predicted patient literacy level was collected by asking the nurse to rate their patient's health literacy level on a scale of zero to six, with zero representative of the patient lacking literacy skills and six representative of a patient who has adequate literacy skills. This response was compared to the patient's actual health literacy level as measured by the NVS. If the nurse was able to accurately predict their patient's health literacy level, a "yes" was recorded on the data collection sheet. If the nurse incorrectly identifies the patient's health literacy level, a "no" was recorded on the data sheet.

Results

Execution

The study was executed as originally designed. Potential study participants were identified and inclusion criteria confirmed by the patient's registered nurse. The registered nurse was consented for the study prior to consenting the patient. Once consent was obtained from the patient, data were collected regarding their health literacy level using the NVS. Data were then collected from the registered nurse, including their predicted patient health literacy level and demographics. There was no missing data noted in the final data collection set.

Results

The model was analyzed to ensure that all test assumptions were met. The dependent variable was noted to be dichotomous, with potential responses of "yes" and "no," and the independent variables were measured at the ordinal level. All observations were noted to be independent with no participant's data counted twice. The data set was also reviewed for multicollinearity amongst the independent variables with a noted VIF of less than 3 for all variables (Table 3). Analysis of the sample size, N=59, revealed that years of experience (p=0.676 to 0.998), highest degree level obtained (p=0.998) and familiarity with the concept of health literacy (p=1.0) are not significant predictors of a nurse's ability to accurately predict a patient's health literacy level (Table 4). Therefore, the null hypothesis is retained.

Data also revealed that an overwhelming majority of registered nurses were unable to accurately identify their patient's health literacy level with 57 of the 59 respondents unable to accurately determine their patient's health literacy level after a sustained period of interaction with them(p<0.05) (Table 5). Sample participants reported varying years of experience with the majority of respondents (54.2%) having between 0 and 3 years of experience (Table 6). Participants also reported having either an associate degree (59.3%) or a bachelor's degree (40.7%), with no graduate or doctoral degrees reported in the sample. In terms of familiarity with the concept of health literacy, the majority of participants (64.4%) reported little to no familiarity with the concept while a small percentage (5%) reported being very familiar with the concept of health literacy.

Table 3: *Collinearity Statistics for Logistic Regression Model*

		Collinearity Statistics	
Model		Tolerance	VIF
1	Yrs Exp	.931	1.074
	Degree	.873	1.145
	HL Famil	.930	1.076

Table 4: *Logistic Regression Output for RN Accuracy in Predicting Patient's Health Literacy Level*

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a	Yrs Exp			.175	3	.982	
	Yrs Exp (1)	-18.969	9028.08	.000	1	.998	.000
	Yrs Exp (2)	-.693	1.658	.175	1	.676	.500
	Yrs Exp (3)	-18.336	7824.791	.000	1	.998	.000
	Degree (1)	16.433	7264.668	.000	1	.998	13699324
	HL Famil			.000	4	1.000	
	HL Famil(1)	3.647	23547.137	.000	1	1.000	38.343
	HL Famil(2)	-14.730	25119.562	.000	1	1.000	.000
	HL Famil (3)	-14.614	25292.387	.000	1	1.000	.000
	HL Famil (4)	1.770	27971.627	.000	1	1.000	5.870
	Constant	-20.773	22482.59	0	1	0.999	.000

Table 5: *Accuracy of Registered Nurse's Predictions of Patient's Health Literacy Level*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	57.0	96.6	96.6	96.6
	No	2.0	3.4	3.4	100.0
	Total	59.0	100.0	100.0	

Table 6: *Demographics of Registered Nurses*

		Frequency	Percent	Valid Percent	Cumulative Percent
Years Experience	0-1 yrs	16.0	27.1	27.1	27.1
	2-3 yrs	16.0	27.1	27.1	54.2
	4-7 yrs	18.0	30.5	30.5	84.7
	8+ yrs	9.0	15.3	15.3	100.0
	Total	59.0	100.0	100.0	

Degree	Associate	35.0	59.3	59.3	59.3
	Bachelors	24.0	40.7	40.7	100.0
	Total	59.0	100.0	100.0	
HL Familiarity	1	22.0	37.3	37.3	37.3
	2	16.0	27.1	27.1	64.4
	3	13.0	22.0	22.0	86.4
	4	5.0	8.5	8.5	94.9
	5	3.0	5.1	5.1	100.0
	Total	59.0	100.0	100.0	

Discussion

Interpretation

Medical-surgical RNs have limited exposure to health literacy during their academic training and are not prepared to address low health literacy in their patient population once they begin practicing in the clinical environment (Macabsco-O'Connell & Fry Bowers, 2011). Through the institutional factor of the SEM, it is understood that RNs have a direct influence on the patient and their care, more specifically, their ability to understand and participate as an active member of the healthcare team. The results of the study did not reveal if a relationship exists between various factors that relate to their own professional knowledge and skill acquisition, such as years of experience and highest degree level obtained, and their ability to accurately predict the patient's health literacy level in the absence of a standardized health literacy assessment tool. Interestingly, even those who felt they were relatively knowledgeable regarding the concept of health literacy were unable to accurately predict their patient's health literacy level.

Limitations

This study does have some limitations. First, the generalizability of the study's findings is limited due to the small sample size and the implementation of the study in a single geographical location. This limitation could be overcome by conducting the study in several rural-border regions along the United-States/Mexico international border. This would also enhance the relatively small sample size noted for the required statistical tests by collected data from a larger sample. Secondly, the healthcare system was experiencing a higher volume of patients in the medical-surgical environment due to a typical seasonal swell in the region's population. To order to meet the increased demand for nursing care, healthcare organizations often utilize agency nurses to supplement their regular workforce. During this peak time, nursing staff could increase by as much as 50% with temporary staff nurses that travel in from other areas of the United States. These nurses would be less familiar with the patient population, including the language, which could lead to an inappropriate assessment of the patient's actual health literacy abilities.

Implications

Without a thorough understanding of what factors could contribute to an RN's abilities to accurately predict their patient's health literacy level, healthcare systems should provide additional education on the concept of health literacy and how to effectively screen for low health literacy in their target patient population (Macabsco-O'Connell & Fry-Bowers, 2011). In terms of positive social change, an increased emphasis on health literacy from an organizational approach and coupled with informed staff may result in an acute awareness of patients who potentially suffer from low health

literacy. RNs could assess the patient's educational needs and amend the plan of care to address knowledge gaps.

Recommendations

Recommendations for future study include expanding the current study model across other rural areas along the United-States/Mexico international border as well as across varying acute populations located within the acute care hospital. This would not only increase the generalizability of the study's findings but also provide a larger sample size to better support statistical analysis. Researchers also must be mindful of the cognitive abilities of the target population who may be receiving acute care services and develop strict inclusion/exclusion criteria to ensure the collection of meaningful data.

Conclusion

This initial study attempted to address a gap within the literature regarding potential factors that could enhance a nurse's ability to accurately predict their patient's health literacy level. While this study was unable to identify such factors, it does contribute to the overall evidence of the need for healthcare organizations to examine their current practices regarding health literacy in the acute care patient population. Increased awareness of health literacy as well as targeted staff educational opportunities may assist with identifying patients who suffer from low health literacy and thus potentially address gaps within their knowledge.

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Patient Predictors of Health Literacy Level in a Rural Border Hospital

Shiloh A. Williams

Walden University

[Notes]

Outlet for Manuscript

Health Promotion Practice is a peer-reviewed journal produced by the Society for Public Health Education, a professional organization that provides education and support to health education professionals around the world (Health Promotion Practice, 2019). The journal focuses on the promotion of evidence-based practices in the health promotion realm, including policy and program development, addressing health education outcomes in diverse populations, and professional and career development for health educators in diverse settings (Health Promotion Practice, 2019). The journal is located at http://journals.sagepub.com.

All manuscripts submitted for publication in Health Promotion Practice undergo a rigorous peer review process and must adhere to the guidelines for submission outlined by the journal, including identification of a conceptual framework, discussion of implications for future practice and/or policy development and suggestions for future research (Health Promotion Practice, 2019). Original research articles must not exceed 3,500 words, excluding the abstract, tables or figures, and references. The journal also provides further guidance, including a limit of 30 references and 5 tables or figures per article (Health Promotion Practice, 2019).

The research question posed for Manuscript 3 seeks to explore the relationship between patient characteristics and health literacy levels in a rural, border region. The study, using the Social Ecological Model's intrapersonal component as a lens with which to view the outcome, aligns with *Health Promotion Practice's* desire to explore health promotion and disease prevention strategies from the social ecological perspective. The

results of the study could provide further insight in to patient characteristics that best predict whether or not a patient has adequate health literacy in a rural, border region.

Abstract

Low health literacy is a common finding in rural and minority communities, especially those challenged with a large number of socioeconomic factors and limited community resources. Patients, especially those who possess English as a second language, struggle with comprehending basic health information thus making it challenging to comply with their prescribed treatment plans or make informed decisions regarding their health. Acute care registered nurses have very little knowledge or experience with identifying low health literacy in their patient population and currently there is not an industry standard to utilize a health literacy assessment tool to determine the actual health literacy level of patients receiving care. Further complicating the issue, is the inconsistency of current literature to identify common indicators of low health literacy in minority populations. Data were collected from 70 medical-surgical patients, finding that educational level was the only significant predictor of a patient's health literacy level. This finding was consistent with other studies that explored health literacy in largely Hispanic populations and further contributes to a growing body of evidence that educational level is a strong predictor of low health literacy in patient populations.

Introduction

Low health literacy is higher in rural and minority communities where factors related to socioeconomic status, limited availability of educational resources, and barriers to health care access are more prevalent (Pop et al, 2013; Sentell & Braun, 2012; Golboni, Nadrian, Najafi, Shirzadi & Mahmoodi, 2017). Health literacy is defined as a patient's ability to acquire, process and understand basic health information to make meaningful informed decisions regarding their health (Ingram, 2018). Patients with low health literacy, or lacking the necessary skills to make informed decisions regarding their care, has been identified as a common barrier for patients in the rural border region. Patients often struggle with comprehending health-related information and complying with their prescribed treatment plan, navigating the healthcare system, and typically suffer from poorer health outcomes (Dickens, Lambert, Cromwell, & Piano, 2013; Harnett, 2017; Krist, Tong, Aycock & Longo, 2017; Louis et al., 2017; Soto Mas & Jacobson, 2019).

The population that dwells along the rural-border region, known as the Imperial Valley, is 84% Hispanic with an estimated 31% of the population being foreign-born (U.S. Census Bureau, 2019). Healthcare within the region is largely government-funded with the population suffering from many social determinants of health, including limited English proficiency and high unemployment and poverty rates. The population is also further hindered by the limited availability of economical and health-related resources to assist them with achieving an ideal state of health and wellness.

Significance

While the relationship between low health literacy and poor patient outcomes and the relationship between poor patient outcomes and minority populations have been extensively explored in the literature, researchers are challenged with consistently identifying predictors of low health literacy within minority populations (Garbers et al, 2010; Soto Mas & Jacobson, 2019). Without an industry standard requiring all patients be screened for the presence of low health literacy during hospitalization, individuals are left vulnerable to the repercussions of not understand their own health and care. By examining the interpersonal factors that may influence health literacy, researchers will have a better understanding of the Hispanic population and have better means to recognize and intervene when low health literacy is present.

The Social Ecological Model (SEM) offers a theoretical framework from which to view the relationships between the patient and their physical and social environment (McDaniel, 2018). Through the exploration of the relationship between the patient and the unique factors that surround them, including intrapersonal, interpersonal, institutional, community and public policy, this study contributes to positive social change by potentially providing healthcare professionals a better understanding how factors of age, grade level, socioeconomic status, language and ethnicity influence health literacy (McCormack, Thomas, Lewis & Rudd, 2017).

Relevant Scholarship

Low health literacy is a concern for patients who live and reside in rural border regions; areas that are often affected by higher rates of poverty, lower educational levels, and limited access to care (Rural Health Information Hub, 2019). Patients who reside in

rural border regions are often faced with multiple barriers when attempting to access preventative and specialty services (Galboni et al, 2017; Rural Health Information Hub, 2019). These barriers include limited access to qualified healthcare providers or comprehensive services, cultural and financial constraints, fear or anxiety related to social stigma, transportation difficulties, and limited knowledge of navigating the complex healthcare system (Douthit, Kiv, Dwolatzky & Biswas, 2015; Golboni et al, 2017; Rural Health Information Hub, 2019). Limited number of providers who are willing to offer free or low-cost services and higher numbers of uninsured and underinsured patients present in the majority of rural areas further contribute to gaps within rural healthcare services (Rural Health Information Hub, 2019). In addition, patients who speak English as a second language (ESL) may be further challenged by the health care system as they attempt to communicate with and learn about their health from a variety of healthcare professionals in multiple healthcare settings (Sentell & Braun, 2012; Soto Mas & Jacobson, 2019). It is critical for healthcare providers to identify and address barriers to access and provide patients with healthcare information that is delivered in a manner by which the patient is able to comprehend and utilize the information to make informed decisions regarding their care.

Unfortunately, researchers have yet to reach a consensus as to what traits can be used by clinicians as potential indicators of the need to deploy health literacy screening tools. For example, Boyas (2013) identified education level as a significant predictor of health literacy level while age, gender, home income, and immigration status were not. Similarly, Galboni et al (2017) found that education status, as well as geographical

location, were strong predictors of low health literacy in minorities from both rural and urban settings (Galboni et al, 2017). However, Shaw, Huebner, Armin, Orzech & Vivian (2009) found that limited English proficiency, rather than education level, was a stronger predictor of low health literacy in minorities, especially the Hispanic and Latino populations. Without a consistent set of factors to consider or a regulatory mandate to screen all patients for low health literacy, healthcare professionals are left ill-informed and must rely on their own knowledge and assessment to determine who may have suffer from low health literacy and require additional interventions to understand their health.

Research Question

What is the relationship among demographic factors (age, ethnicity, language, gender and highest level of school completed) and the health literacy level of patients who are hospitalized on a medical-surgical unit in a rural-border region?

H_0: There is no relationship between demographic factors (age, ethnicity, language, gender and highest level of school completed) and the health literacy level of patients who are hospitalized on a medical-surgical unit in a rural-border region.

H_1: There is a relationship between demographic factors (age, ethnicity, language, gender, and highest level of school completed) and the health literacy level of patients who are hospitalized on a medical-surgical unit in a rural-border region.

Methods

The target population for this study was alert and oriented adult patients who were 18 years of age or older, receiving care in a rural-border acute care medical-surgical setting and who were paired with a registered nurse responsible for their primary care. In

order to be considered for the study, the patient must have received care from the consented registered nurse for a minimum of 6 hours prior to the data collection period. This 6-hour window ensured the patient had received an appropriate head-to-toe assessment by the registered nurse as well as undergone standard nurse-patient interactions typical of the medical-surgical environment, such as medication administration, dressing changes or plan of care reviews. This criterion was confirmed by the registered nurse prior to obtaining consent and the study required both the nurse and the patient consent to participation in the study. Patients who were identified as having admitting diagnoses of altered mental status, confusion, dementia, or encephalopathy, as reported by their registered nurse, were excluded from the study.

The patient's health literacy level was assessed using the Newest Vital Sign (NVS), a validated health literacy assessment tool. The NVS tool is available and has been validated in both English and Spanish populations and does not require special permission from the author to use in research studies (Weiss, 2018). A language interpretation resource was utilized to obtain consent and administer the tool for patients who indicated their primary language to be Spanish. All participants in the study reported their primary language to be either English or Spanish.

Sampling and Power

A convenience sample as comprised of patients who met the above parameters who were deemed eligible to participate in the study and had given consent. The sample size for this study was determined by conducting an *a priori* power analysis using G*Power software (Faul, Erdfelder, Lang & Buchner, 2017). Assuming an alpha of 0.05,

effect size of 0.20 and a power of 0.80, the G*Power for an ordinal regression indicates a sample size of 70 participants would be needed to assure sufficient power and reduce the likelihood of a type 2 error (Faul, Erdfelder, Lang & Buchner, 2017). Patients who consented to participate in the study were assigned a unique identification number that represented their relationship in the study but also secured anonymity amongst the participant pool.

Design and Analysis

The cross-sectional correlation study utilized an ordinal regression model to examine the relationship between the patient's demographic characteristics and their associated health literacy level. The dependent variable for the study was the patient's health literacy level as determined by the NVS and was measured at the ordinal level. The NVS was administered and the patient's score obtained using the NVS's scoring rubric. The dependent variable had potential results of "limited literacy likely," "limited literacy possible" and "adequate literacy." This data was recorded on the data collection sheet.

The independent variables for this study consisted of patient-specific characteristics including the patient's reported *age, ethnicity, highest grade of school completed, gender* and *primary language*. The variable *age* was measured at the ordinal level with potential responses of "18-30 years," "31-40 years," "41-50 years," "51-60 years," "61-70 years," "71-80 years," and "81 or more years." The variable *ethnicity* was measured at the nominal level with potential responses of "Hispanic" and "non-Hispanic." The variable *highest level of school completed* was measured at the ordinal

level with potential responses of “less than high school,” “some high school,” “high school graduate,” “some college,” “two-year college or university degree/Associate’s degree,” “four-year college or university degree/Bachelor’s degree,” “some post-graduate or professional schooling” and “post-graduate or professional schooling/Master’s Degree/Doctoral Degree.” The variable *gender* was measured at the nominal level with potential responses of “male” and “female.” The variable *primary language* was measured at the nominal level with potential responses of “English,” “Spanish,” and “Other.”

Results

Execution

This study was executed as designed with data collected from 70 participants. Study participants were initially identified by the medical-surgical floor charge nurse and confirmed by the patient’s registered nurse. Consent was obtained from the participant and data were collected, including their health literacy level using the NVS. There were no missing data in the final study data set.

Results

The model was analyzed to ensure that all test assumptions were met. The dependent variable was measured at the ordinal level while the independent variables were measured at categorical and ordinal levels. The data set was also reviewed for multicollinearity amongst the variables with a noted VIF of less than 3 for all variables (Table 7). Analysis of the sample size, N=70, revealed that the *highest level of school completed* was the only statistically significant independent variable in the sample. In

terms of the goodness of the model fit, the model was deemed significant with a $\chi 2$ = 13.328, p< 0.05. The *highest level of school completed* had a statistically significant effect of Wald $\chi 2$ 0.596 with a $p<0.05$ (Table 7). This resulted in a relationship between the dependent variable and the independent variable with an increase in the level of school completed being associated with an increase in the odds of having a higher health literacy level, odds ratio of 1.816 (95% CI, 1.201 to 2.745). Therefore, the null hypothesis was rejected.

Data also revealed that 71.4% of the study participants were between 51 and 70 years of age with 61.4% (n=43) identifying as males and 38.6% (n=27) identifying as females. In terms of ethnicity, 78.6% (n=55) identified as Hispanic while 21.4% (n=15) identified as being non-Hispanic, a finding consistent with the region's population. Over half of the participants (64%, n=45) indicated Spanish was their primary language with the remaining participants (35.7%, n=25) reporting English as their primary language and no participants reporting a different language.

Table 7: *Collinearity Statistics for Ordinal Regression Model*

		Collinearity Statistics	
Model		Tolerance	VIF
1	Age	.740	1.351
	Ethnicity	.548	1.825
	Language	.585	1.710
	Gender	.923	1.083

Table 8: *Ordinal Regression Output for Patient Demographic Factors vs. Patient Health Literacy Level.*

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound

Threshold	Limited Likely	1.777	1.545	1.322	1	.250	-1.252	4.805
	Limited Possible	4.559	1.638	7.742	1	.005	1.348	7.770
Location	Age	.061	.245	.062	1	.803	-.419	.542
	Educational Lvl	.596	.211	8.003	1	.005	.183	1.010
	Hispanic	.230	.796	.083	1	.773	.1.331	1.791
	Non-Hispanic	0	.	.	0	.	.	.
	Egnlish	.574	.702	.670	1	.413	-.801	1.950
	Spanish	0	.	.	0	.	.	.
	Male	.532	.529	1.011	1	.315	-.505	1.569
	Female	0	.	.	0	.	.	.

Table 9: *Medical-Surgical Patient Demographics*

		Frequency	Percent	Valid Percent	Cumulative Percent
Age	31-40 yrs	5	7.1	7.1	7.1
	41-50 yrs	3	4.3	4.3	11.4
	51-60 yrs	28	40.0	40.0	51.4
	61-70 yrs	22	31.4	31.4	82.9
	71-80 yrs	9	12.9	12.9	95.7
	81+ yrs	3	4.3	4.3	100.0
	Total	70	100.0	100	
Ethnicity	Hispanic	55	78.6	78.6	78.6
	Non-Hispanic	15	21.4	21.4	100
	Total	70	100	100	
Language	English	25	35.7	35.7	35.7
	Spanish	45	64.3	64.3	100.0
	Total	70	100.0	100.0	
Gender	Male	43	61.4	61.4	61.4
	Female	27	38.6	38.6	100.0
	Total	70	100	100.0	

Discussion

Interpretation

The study's findings are consistent with the literature in that an individual's education level is a strong predictor of their health literacy level (Boyas, 2013, Galboni et al, 2017). However, this study did not find that the patient's language was a significant

indicator of health literacy level as previously reported by Shaw, Huebner, Armin, Orzech and Vivian (2009). When viewed through the lens of the SEM, the patient's educational level has a significant influence on their ability to understand health-related information and utilize it to make meaningful decisions regarding their care (Ingram, 2018; McDaniel, 2018). As supported by the study's findings, the more schooling an individual completes the better the odds they possess adequate health literacy skills to effectively participate as a member of their own healthcare team.

Limitations

There were some limitations to this study. First, the study was conducted in a single rural-border geographical region. While rural-border regions have similar demographics, there are colloquial differences in the regions and their populations. Performing the study in additional rural-border regions would help increase the generalizability of the study's findings to a wider population. Secondly, at the time the study was conducted, the healthcare organization was experiencing a seasonal patient volume surge. When these surges occur, organizational leadership relies on nurse staffing agencies to provide additional nurses to help provide care for the patients admitted to the medical-surgical environment. Often, these agency nurses are from various parts of the country and may not have a thorough understanding of the patient culture or language. This could limit the nurse's ability to accurately assess a patient's health literacy level. Lastly, it was noted during data collection that participants who had been born or raised across the border in Mexico participated in a very different educational system structure. For example, in the public-school system in Mexico, students attend primary and

secondary school rather than elementary or junior high school. University studies also start during early adolescence, when an American student would be entering high school. The educational system scale used in this study for the variable *highest level of school completed* was limiting in that patients often had to explain their educational background and then select the best fit from the available scale. This could lead to patients not being placed in the appropriate groups within the study and thus hinder the accuracy of data analysis.

Implications

This study further contributes to the literature by providing additional evidence of the use of a patient's stated educational level as a potential indicator of their overall health literacy level. In the absence of a mandated use of standardized health literacy assessment tools, RNs may be able to better identify when low health literacy is present in their patient population by assessing for the patient's education level. In terms of positive social change, the RN's ability to recognize low health literacy and provide meaningful interventions to assist the patient to better understand and participate in their care would result in better outcomes and more informed decision-making on the part of the patient.

Recommendations

Recommendations for further study include the implementation of the study in other rural-border regions to better understand the relationship between the registered nurse, patient and the patient's health literacy level. The researcher should also address the varying educational system structures, especially if they anticipate encountering a

large number of foreign-born participants. This would produce higher quality data and support better analysis and study findings.

Conclusion

This study provides additional support for the use of a patient's education level, a data point often collected upon admission to a health care facility, as an indicator of the patient's abilities to understand health-related information. It also provides additional evidence to further address the inconsistencies noted in the literature regarding patient-specific factors related to health literacy. Registered nurses in the acute-care medical-surgical environment can use this information, even in the absence of a standardized health literacy assessment tool, to better identify when low health literacy may be a factor in a patient's ability to understand and actively participate as a member of the healthcare team.

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Part 3: Summary

Integration of the Studies

This study sought to explore the relationships between the health literacy levels of medical-surgical patients and the medical surgical nurses providing care for them in a rural border region. Current literature indicates there is a strong relationship between a patient's health literacy levels and their abilities to effectively understand and make decisions regarding their own health. In the acute care medical-surgical environment, patients are often given a new diagnosis or are struggling to manage their chronic condition. Medical Surgical registered nurses are in a critical position to identify patients who may be suffering from low health literacy and alter their plan of care to address identified gaps in their patient's knowledge or skill. This may lead to better understanding of their own health and their treatment plan and allow them to participate as an active member of their own health care team.

Results of the study showed that nurses were unable to accurately predict their patient's health literacy level, a finding consistent with other studies in which healthcare providers were asked to perform a similar action (Dickens, Lambert, Crowell & Piana, 2013). This finding is concerning as registered nurses are responsible for providing education and ensuring the patient understands and is agreeable to their plan of care when admitted in to the acute care environment. In terms of social change, if the registered nurse fails to recognize that the patient may also be suffering from low health literacy, then the patient may not receive proper interventions and educational materials that address this deficiency. In the absence of a standardized health literacy tool, registered

nurses must look for other factors, such as the patient's educational level, to provide an indication that low health literacy may be an issue in their patient's abilities to understand and participate as a member of their own healthcare team. This finding is directly supported by the SEM in which the influence of the institutional environment, in this case the registered nurse, could have a positive impact on the individual patient's health.

There was no relationship between the registered nurse's ability to accurately predict their patient's health literacy level and the nurse's experience, degree level or knowledge of the concept of health literacy. Registered nurses enhance their knowledge and skills initially through in-depth academic study and then through experiences working as a professional nurse. Their knowledge and skills are further enhanced through advanced educational opportunities, such as when they obtain a higher education degree.

Health literacy in minority populations is also another concern for healthcare professionals. This study provided additional support for the use of a patient's educational level as an indicator of their health literacy level. This finding is also supported by the SEM as the patient's intrapersonal factors directly influence their ability to understand their health and healthcare plan. The study's findings also contribute to the literature by addressing an inconsistency in identifying which patient factors are a better regarding representative of the patient's health literacy abilities.

In terms of future research, it will be important to expand the current study model to include additional rural-border areas as well as explore health literacy in other acute populations, such as in the maternal-child or emergency department. The researcher

should consider the acute status of the patient when designing and implementing the study to ensure they are able to provide effective data.

Conclusion

Registered nurses play a critical role in a patient's ability to understand and participate as an active member of the healthcare team. While there is no mandate to utilize a standardized health literacy assessment tool, it is apparent that healthcare professionals, including registered nurses, are unable to identify when low health literacy may be present in their population. If low health literacy is not considered or addressed by the medical-surgical registered nurse, the patient may experience poor outcomes, including recurrent hospitalizations and the development of secondary chronic illnesses. Effective education and communication are critical elements to supporting and empowering patients to control their health and actively participate in decisions regarding their healthcare. The registered nurse's understanding of the importance of health literacy and use of predicting factors, such as a patient's educational level, will help identify and address low health literacy in an already challenged rural-border population.

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Appendix A: Permission to Use Newest Vital Sign Tool

Perspective

The Newest Vital Sign: Frequently Asked Questions

Barry D. Weiss, MD

The Newest Vital Sign (NVS) is one of the most widely used health literacy screening instruments (Shealy & Threatt, 2016; Weiss et al., 2005). The original version of the NVS was developed in English and Spanish and validated in the United States for identifying people with limited health literacy skills (Weiss et al., 2005). Since then, the NVS has been adapted and validated for use in other languages and countries, including the United Kingdom (Rowlands et al., 2013), the Netherlands (Fransen et al., 2014), Japan (Kogure et al., 2014), Italy (Capecchi, Guazzini, Lorini, Santomauro, & Bonaccorsi, 2015), Kuwait (Al-Abdulrazzaqa, Al-Haddadb, AbdulRasoula, Al-Basarib, & Al-Taiara, 2015), Brazil (Rodrigues, de Andrade, González, Birolim & Mesas, 2017), China (Xue et al., 2018), and Canada (Mansfield, Wahba, Gillis, & Weiss, 2018). It has also been adapted for administration in American Sign Language (McKee et al., 2015).

To administer the NVS, a person is presented with a nutrition label from a container of ice cream and asked six questions about the label. Correct responses require the ability to identify and interpret basic text and perform simple mathematical computations.

The assessment takes 2 to 3 minutes (Eubanks et al., 2017; Johnson & Weiss, 2008; Welch, VanGeest, & Caskey, 2011), and the probability of a person having limited health literacy is estimated by counting how many of the six questions are answered correctly. With 0 to 1 correct answers, people are scored as having a high likelihood (50% or more) of limited health literacy. With 2 to 3 correct answers, a person has a possibility of limited health literacy. A score of 4 to 6 almost always indicates adequate health literacy using the Test of Functional Health Literacy in Adults as the reference standard (Weiss et al., 2005).

As lead author on the article (Weiss et al., 2005) that reported the original development and validation of the NVS, I receive inquiries regularly asking about proper methods for administration and interpretation from investigators planning to use it in their work. In this article, I list frequently asked questions and provide answers based on the original validation study (Weiss et al., 2005), firsthand administration of the tool, and published reports and communications from investigators around the world who have used the NVS.

QUESTION 1

Do I need to obtain permission to use the NVS in clinical settings or research projects?

No. Anyone is free to use the NVS in their clinical or research work at no cost. No permission is required.

QUESTION 2

Can I give the nutrition label and questions to patients or research participants, have them read the six questions on their own, and have them write down their answers, rather than reading the questions to them and having them answer out loud?

Barry D. Weiss, MD, is a Professor, Department of Family and Community Medicine, University of Arizona College of Medicine.

Address correspondence to Barry D. Weiss, MD, Department of Family and Community Medicine, University of Arizona College of Medicine, 655 N. Alvernon Way, Suite 228, Tucson, AZ 85711; email: bdweiss@u.arizona.edu.

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No. The NVS was developed as an interviewer-administered health literacy assessment. Asking patients or research participants to read and answer the questions on their own (i.e., self-administration) would add a level of complexity (i.e., the need to read and understand the questions that would otherwise be read to them) that would threaten the validity of the assessment. Similarly, having people write down answers would add a level of complexity (i.e., the need to write) that was not addressed in validating the NVS.

There have been at least two studies of self-administration and both had similar findings. One study involved adolescents in school (L. A. Linnebur & Linnebur, 2018) and the other involved patients in a low-income, primary care setting setting (Warren-Findlow, 2014). In both studies, only about one-half of the participants were able to complete the assessment and there was no comparison with interviewer administration. Thus, there is no evidence that the instrument yields valid results when self-administrated as a paper-and-pencil assessment.

QUESTION 3

Can an interviewer administer the NVS to groups of patients or research participants, rather than administering it one-on-one?

No. The NVS has not been validated for group administration. Group administration has the potential to cause embarrassment for people who have difficulty answering the questions in the company of other people. This, in turn, could cause anxiety, impair their performance, and lead to in inaccurate results.

QUESTION 4

What do I say when participants seem to flounder and say they can't answer one or more of the questions?

Don't do anything to make a participant feel like they are inadequate or having trouble. Just say something like, "That's fine. Let's just go on to the next question." The unanswered question gets a score of 0.

QUESTION 5

What do I say when participants ask "How am I doing?" or "Did I get that question right?"

Just say something like, "You are doing fine. Now let's go on to the next question."

QUESTION 6

If a patient or research participant asks for pencil and paper to aid in math calculations, can I provide them?

Yes. That is acceptable.

QUESTION 7

Can I give a calculator to participants if they ask for one?

Yes. Based on one study (Miser, Wallace, & Rayan, 2013), it appears that use of a calculator versus no calculator does not change the results of the NVS assessment; however, you should not spontaneously offer a calculator. You should only provide a calculator if a participant asks for one.

QUESTION 8

Can I administer the NVS by computer?

Yes, with caveats. Until recently, the answer to this question would have been no. However, a recent project, led by the Bureau of Nutritional Sciences of Health Canada, developed an NVS module suitable for computer administration (Mansfield, Wahba, Gillis, & Weiss, 2018). The module uses a visual presentation with voice-over narration that provides participants with visual and oral instructions, so they do not have to read anything. There are two version of the module (one in English and one in French) and the nutrition label is modeled after the nutrition labels used in Canada.

When studied in a diverse population, computer administration and standard one-on-one interviewer administration performed similarly. Only 8% of 222 participants scored in a different health literacy category (low health literacy likely versus low health literacy possible versus adequate health literacy) on computer versus interviewer administration. More importantly, only 3 (1%) of the 222 participants were scored as having adequate health literacy on one version when the other version scored them as low health literacy likely or possible.

However, for this approach to be effective and valid, a lengthy development process was necessary, including extensive user testing along with development and validation of multiple-choice distractor responses for use in the narrated module. Practitioners interested in using or developing a module for computer administration should consult the procedures used by Health Canada (Mansfield, Wahba, Gillis, & Weiss, 2018)

QUESTION 9

Can I translate the NVS into other languages?

Yes, but several issues need to be taken into consideration. The original NVS was developed and validated in English and Spanish and was based on the nutrition labels used in the United States. Nutrition labels are often formatted differently and have different content in other countries. When people look at unfamiliar nutrition labels, answering the NVS questions may be more difficult than when they answer the questions using one that is familiar, thus jeopardizing the results

of the NVS assessment. Furthermore, using the NVS in another language or in another county is not simply a matter of translation. Although the NVS has been successfully adapted for use in other countries and in languages, these adaptions all involved extensive focus group testing and cognitive interviews to assure accurate translations and cultural appropriateness, in addition to validation studies that compared the results of health literacy assessments with the translated NVS to assessments using other health literacy instruments.

Even for adapting the original American English version for use in other English-speaking countries (i.e., The United Kingdom and Canada), an extensive process and validation effort was required (Mansfield, Wahba, Gillis, & Weiss, 2018; Rowlands et al., 2013). Practitioners interested in translating and adapting the NVS for use in other countries and languages should refer to reports of those validation processes to see what was involved.

QUESTION 10

Do I need any special permission if I'm creating a new version of the NVS (i.e., translating it into other languages or developing computer modules)?

Yes. Permission must be obtained from the copyright holder before undertaking adaption of the NVS into a language or format other than the original. Information about how to obtain this permission (which is granted at no cost) can be obtained from the author of this article.

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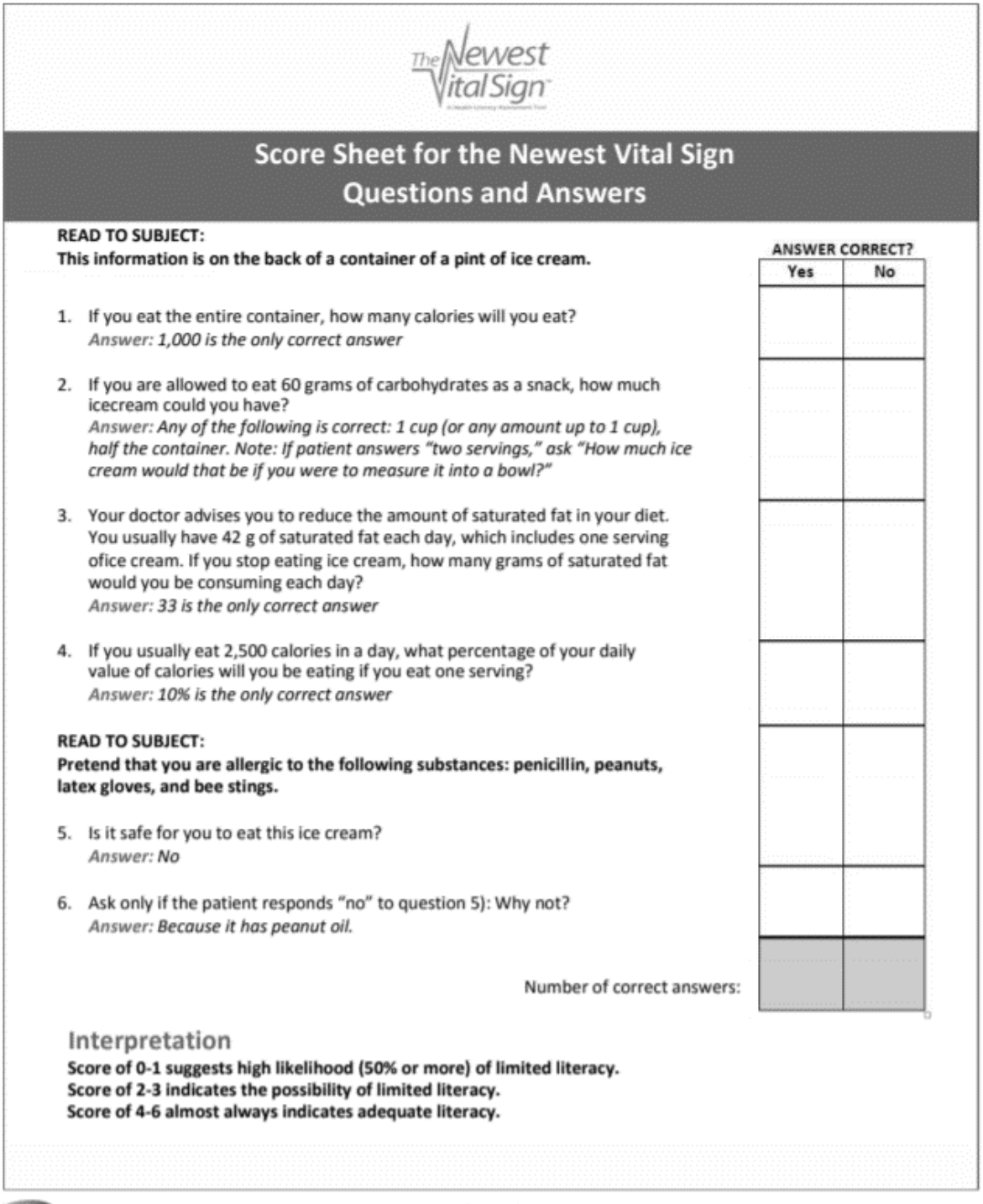
Appendix B: Newest Vital Sign Tool- English

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.



The Newest Vital Sign

Score Sheet for the Newest Vital Sign Questions and Answers

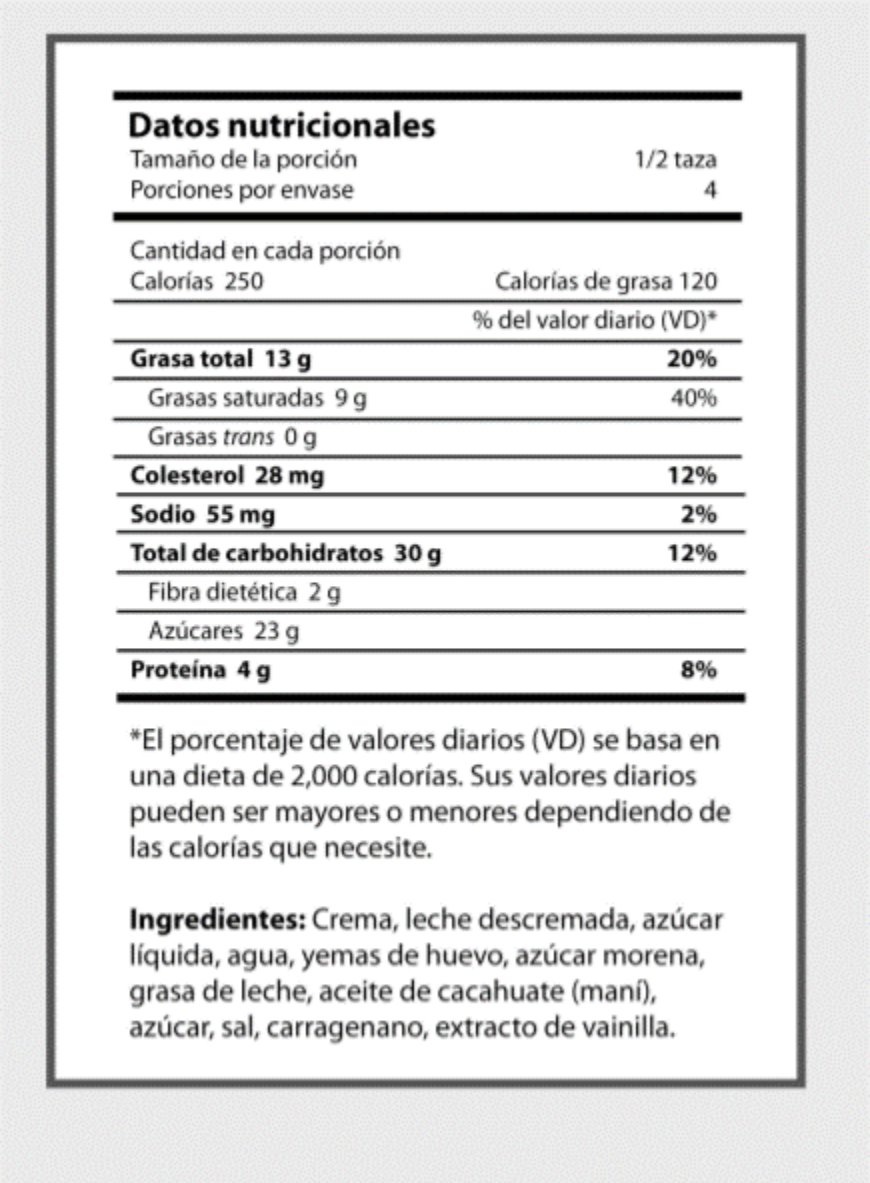
READ TO SUBJECT:
This information is on the back of a container of a pint of ice cream.

	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 icecream 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 ofice 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.

Appendix C: Newest Vital Sign Tool- Spanish



Datos nutricionales

Tamaño de la porción	1/2 taza
Porciones por envase	4
Cantidad en cada porción	
Calorías 250	Calorías de grasa 120
	% del valor diario (VD)*
Grasa total 13 g	**20%**
Grasas saturadas 9 g	40%
Grasas *trans* 0 g	
Colesterol 28 mg	**12%**
Sodio 55 mg	**2%**
Total de carbohidratos 30 g	**12%**
Fibra dietética 2 g	
Azúcares 23 g	
Proteína 4 g	**8%**

*El porcentaje de valores diarios (VD) se basa en una dieta de 2,000 calorías. Sus valores diarios pueden ser mayores o menores dependiendo de las calorías que necesite.

Ingredientes: Crema, leche descremada, azúcar líquida, agua, yemas de huevo, azúcar morena, grasa de leche, aceite de cacahuate (maní), azúcar, sal, carragenano, extracto de vainilla.

The Newest Vital Sign

Hoja de Resultados para el Nuevo Signo Vital
Preguntas y Respuestas

LEA AL SUJETO DEL ESTUDIO:
Esta información aparece al reverso de un envase de helado.

	¿RESPUESTA CORRECTA? sí	no
1. Si consume todo el helado en el envase, ¿cuántas calorías habrá consumido? *Respuesta: 1,000 es la única respuesta correcta*		
2. Si le permiten consumir 60 gramos de carbohidratos como refrigerio, ¿cuánto helado puede consumir? *Respuesta: Cualquiera de las siguientes es correcta: 1 taza (o cualquier cantidad hasta 1 taza), la mitad del envase". Nota: si el sujeto del estudio responde "dos porciones", pregunte "¿Cuánto helado sería si lo midiera para ponerlo en un tazón?"*		
3. Su médico le aconseja reducir la cantidad de grasa saturada en su dieta. Usted normalmente consume 42 gramos de grasa saturada al día, que incluyen una porción de helado. Si deja de consumir helado, ¿cuántos gramos de grasa saturada consumiría cada día? *Respuesta: 33 gramos es la única respuesta correcta*		
4. Si normalmente consume 2,500 calorías al día, ¿qué porcentaje de su valor diario de calorías habrá consumido si consume una porción? *Respuesta: 10% es la única respuesta correcta*		
LEA AL SUJETO DEL ESTUDIO: **Imagínese que es alérgico/a a las siguientes sustancias: penicilina, cacahuate (maní), guantes de látex y picaduras de abeja.**		
5. ¿Es seguro consumir este helado? *Respuesta: No*		
6. (Pregunte sólo si responde "no" a pregunta 5): ¿Por qué no? *Respuesta: Porque tiene aceite de cacahuate (maní)*		
Número de respuestas correctas:		

Interpretación

Resultado de 0-1 sugiere alta probabilidad (50% o más) de alfabetización limitada.
Resultado de 2-3 indica la posibilidad de alfabetización limitada.
Resultado de 4-6 casi siempre indica alfabetización adecuada.