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Assessing and Evaluating Health Literacy Practices in the Ambulatory Setting

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Final DNP Project Report

Assessing and Evaluating Health Literacy Practices in the Ambulatory Setting

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Dedication

I would like to dedicate my DNP project to my husband, who always provides me encouragement and support. He gave me the extra push I needed when times were really tough and never doubted my ability. I would also like to dedicate this project to my family for their patience with my demanding work and school schedule, and for always providing me with love and support.

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Abstract

Purpose: The purpose of this study is to assess health literacy knowledge and practices among ambulatory care providers who care for patients with type 2 diabetes.

Methods: Healthcare professionals who provide diabetes care and education were invited to participate in a health literacy education session with a pre and post-intervention knowledge survey. A retrospective chart review was conducted to evaluate health literacy practices in three PCP and three endocrinology offices. An evaluation of health literacy practices was used to compare PCP and endocrinology practices and determine if health literacy practices correlated to controlled hemoglobin a1c values.

Results: Healthcare professionals are knowledgeable of health literacy. Gaps in knowledge were identified through the pre and post-intervention surveys. It was also identified that endocrinology offices were more likely to provide verbal or written education, but had fewer patients with controlled hemoglobin a1c levels compared to primary care offices. The retrospective chart review revealed that healthcare providers are not assessing patient education preference and are not using formal health literacy tools.

Conclusions: Healthcare professionals are knowledgeable about health literacy, and verbalized appreciation and the value they found in the health literacy education provided. It was also identified that health literacy is currently not being evaluated by health care professionals in primary care and endocrinology offices in a large healthcare system. Since there is little evidence to support improved outcomes when literacy is assessed use of formal tools to assess health literacy is not recommended. Instead, the recommendation is for all ambulatory staff to be educated about health literacy and to adopt universal health literacy precautions.

Background

The Institute of Medicine's (2004, p. 20) Committee on Health Literacy, defines health literacy as "the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services needed to make appropriate health decisions." In the United States, only 12% of the adult population has either a competent or proficient level of health literacy (U.S. Department of Health and Human Services, 2017). A patient's lack of health literacy may not be immediately evident, especially in a population that functions adequately outside of the healthcare setting. A person may be proficient in reading, writing, and making decisions outside of a healthcare situation, but have difficulty understanding their own health problems and making decisions accordingly (Shealy & Threatt, 2016). This can make it difficult for health care providers to suspect a health literacy problem in some of their patients. Since low health literacy affects people of all educational and socioeconomic backgrounds, the total impact is extensive (Shealy & Threatt, 2016).

The financial impact from inadequate health literacy is estimated to be between $106 billion to $238 billion annually (Vernon, Rosenbaum & DeBuono, 2007). This financial burden will only continue to grow, with an annual cost increasing to an estimated $1.6 to 3.6 trillion dollars (Vernon et al., 2007). Focusing on health literacy could provide great cost-saving potential for healthcare systems. According to Shealy and Threatt (2016, p. 687), "Efforts to assess health literacy and design interventions to minimize negative health consequences are essential to improving healthcare and decreasing its economic burden." Improved health literacy could provide multiple cost reductions, such as: a reduction in the number of emergency department visits, decreased hospital admissions, fewer medication errors, and improved

adherence to medication regimens and health screenings (Hudson, Rikard, Staiculescu, & Edison, 2018).

Low health literacy not only costs healthcare systems a significant amount of money each year; it is also a major safety issue. Medication errors resulting in improper dosing are one of the major risks linked to low health literacy (Wolf & Bailey, 2009). The Joint Commission (2007) also states that issues with health literacy and poor patient-provider communication lead to avoidable adverse events. Author, Dr. Allan Frankel (2008, p. 1573), discusses patient risk in the healthcare setting, "Healthcare professionals, who tend to write and speak at a graduate level, get little training or organizational support about how to bridge this comprehension chasm. As a result, medical documents are often written at a 10th grade level or higher, and verbal communications are fraught with opportunities for misunderstanding." Researcher, Dr. Kessels (2003), recognized that patient's memory for medical information is frequently inaccurate, especially if the patient is anxious or elderly. He also concluded that patients tend to forget instructions about follow up and treatment plans because they are focused on the medical diagnosis. In addition, research has identified that patients only comprehend and recall approximately half of information discussed during clinical visits (Hersh, Salzman, & Snyderman, 2015). Medical professionals providing patient education and instruction in a method that meets the patients' individual needs and learning style, as well as assessing patient comprehension of their medical plan, could lead to a reduction in risks, such as medication errors.

To address these problems, a national action plan was created by the U.S. Department of Health and Human Services in 2010 to improve health literacy in the United States, and is comprised of two core principles. The first principle states that all people have the right to

information that aids in their ability to make informed health care decisions. The second

principle states that health services should be delivered in an easy-to-understand manner and

given with the intention to improve a person's health, longevity, and quality of life. The national

action plan contains seven goals to improve health literacy:

1. Develop and disseminate health and safety information that is accurate, accessible, and actionable

2. Promote changes in the health care system that improve health information, communication, informed decision-making, and access to health services

3. Incorporate accurate, standards-based, and developmentally appropriate health and science information and curricula in child care and education through the university level

4. Support and expand local efforts to provide adult education, English language instruction, and culturally and linguistically appropriate health information services in the community

5. Build partnerships, develop guidance, and change policies

6. Increase basic research and the development, implementation, and evaluation of practices and interventions to improve health literacy

7. Increase the dissemination and use of evidence-based health literacy practices and interventions

The National Institutes of Health (NIH) also endorses the importance of the emerging

area of health literacy and the need for improved health literacy among patients, acknowledging

that health literacy "Saves Lives. Saves Time. Saves Money" (NIH, 2017). The NIH (2017)

counsels that healthcare organizations have a responsibility to develop procedures and systems to

ensure that patients understand their medical care while in a healthcare setting. Health literacy is

relatively new area of research, and there is not yet a clear consensus on best practices.

There are several standardized tools available to assess health literacy in the ambulatory setting such as the Newest Vital Sign, Test of Functional Health Literacy in Adults (TOHFLA), the Rapid Estimate of Adult Literacy in Medicine (REALM), and the Spoken Knowledge in Low-Literacy Diabetes (SKILLD). However, it is currently inconclusive as to whether the use of such tools is beneficial in an ambulatory setting. An article in the American Family Physician (Hersh, Salzman, & Snyderman, 2015, p. 118) states, "Although there are a number of tools that screen for limited health literacy, they are primarily used for research. Routinely screening patients for health literacy has not been shown to improve outcomes and is not recommended. Instead, multiple professional organizations recommend using universal health literacy precautions to provide understandable and accessible information to all patients, regardless of their literacy or education level."

Currently, assessing health literacy skills in an office setting is not a recommended practice in routine clinical care due to lack of evidence that it improves outcomes (Hersh, Salzman, & Snyderman, 2015). According the Joint Commission (Jordan, L., 2016, p. 7), "there is no clear 'consensus' on a health literacy measurement but a convergence to more comprehensive tools. There is a trend towards a mixed measurement (self-report and direct test) of health literacy." The Joint commission (Jordan, L., 2016) further explains that formally testing health literacy could drive illiterate or semi-literate patients to other health care facilities due to feelings of inadequacy and stigmatization. An alternative to a formal health literacy assessment would be to ask appropriate assessment questions and identify behavioral cues (Jordan, L., 2016). One example of an assessment question would be, "Many people have trouble reading and remembering health information because it is hard to understand. Is this ever a problem for you?" (Jordan, L., 2016). Nurse Dr. Sandy Cornett (2009) asserted that unless medical

professionals are properly trained to effectively communicate with patients and how to properly choose appropriate educational materials, knowing a patient's level of health literacy does not improve care.

An example of the Joint Commission's recommendation for health literacy practices in action is The Agency for Healthcare Research and Quality's (AHRQ, 2018) Health Literacy Universal Precautions Toolkit. The AHRQ's 2nd edition toolkit aims to simplify health care, and improve patient understanding of health information, while supporting patients of all health literacy levels. One of the tools included in the AHRQ 2nd Edition Toolkit (2015) is the use of the teach-back method. The teach-back method is important to use on every patient regardless of literacy level, because it is essential to confirm that patients understand the information they were given. With this method, patients are asked to explain in their own words the plan of care discussed by the medical professional to validate their understanding. The teach-back method is different from a formal health literacy tool in that it does not test the patient's health literacy ability, but rather the medical professional's ability to explain. The AHRQ (2018) is recommending that medical professionals should assume all patients have low health literacy and therefore should create a universal environment where patients can succeed.

Health Literacy for Patients with Diabetes

Diabetes is a complex chronic condition in which patients must navigate difficult lifestyle and medication regimens. Health literacy is therefore especially important for patients with diabetes to be able to successfully manage their condition.

According to the National Diabetes Statistics Report 2017 (Centers for Disease Control, 2017), there were an estimated 30.2 million people (of all ages) with diabetes in the United States in 2015, accounting for 9.4% of the US population. The prevalence of diabetes varied

significantly based on education level: 12.6% of adults with less than a high school education had diagnosed diabetes, 9.5% of those with a high school education and 7.2% of adults with more than a high school education had type 2 diabetes (CDC, 2017). The correlation of people with lower educational backgrounds having a higher prevalence of diabetes indicates that evaluation of health literacy is particularly important in patients with type 2 diabetes.

The 2017 National Standards for Diabetes Self-Management Education and Support (2017, p.1409), "Diabetes self-management education and support (DSMES) is a critical element of care for all people with diabetes. DSMES is the ongoing process of facilitating the knowledge, skills, and ability necessary for diabetes self-care, as well as activities that assist a person in implementing and sustaining the behaviors needed to manage his or her condition on an ongoing basis, beyond or outside of formal self-management training" (Beck, Greenwood, Blanton, Bollinger, Butcher, Condon, Cypress, & et al., 2017, p.1409). In order for patients with diabetes to avoid or delay complications, it is necessary for them to ascertain how to manage diabetes (Beck & et al., 2017). The 2017 National Standards for Diabetes Self-Management Education and Support list ten standards of care for diabetes self-management education and support. Standard three calls for evaluation of the population being served, with education, support opportunities and tools that align with the patients' needs (Beck & et al., 2017).

A barrier to quality diabetes self-management is low health literacy (Garcia & et al., 2015). Assessment of a patients' health literacy is an opportunity to see patients' specific needs for diabetes education. In patients with diabetes, health literacy is connected to diabetes comprehension, glycemic control, self-efficacy and self-care behaviors (Cavanaugh, 2011). The author, Dr. Kerri Cavanaugh (2011, p. 191) asserts, "Low health literacy characterizes a vulnerable patient population that is at high risk of poor diabetes outcomes." In another study by

Dr. Cavanaugh and colleagues (2008), it was found that patients with diabetes frequently have low numeracy skill; which is associated with fewer self-management behaviors, as well as decreased glycemic control.

Theoretical Framework

The theoretical framework used to guide this study was the Betty Neuman Health Care System Model. Neuman's Health Care System Model focuses on each person as a complete system. Neuman centers the theory's attention on a nursing goal to assist in maintaining client stability (Polit & Beck, pg. 133, 2012). In practice there is often a disconnect between treatment of the patient as a whole and treatment of their diagnosis. This theoretical framework is applicable to this study because a patient's health literacy ability is often not considered in treatment plans. Improving patient health literacy is only possible if the medical professionals themselves are knowledgeable of health literacy practices. Therefore, an essential step to improving health literacy in patients is the assessment of health literacy knowledge and the provision of health literacy education to providers and staff. Patients entering into an environment where health literacy is prioritized will enable the healthcare system to treat patients as a whole being, and more than just their diagnosis.

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Purpose

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The purpose of this study is to assess health literacy knowledge and practices among ambulatory care providers who care for patients with type 2 diabetes. The specific aims for this study include:

Aim 1: Assess health literacy knowledge among primary care and endocrinology medical professionals and evaluate the effect of a health literacy educational intervention on medical professionals' knowledge.

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Aim 2: Assess and compare health literacy practices among primary care and endocrinology providers who treat patients with type 2 diabetes.

Aim 3: Describe the relationship between health literacy practices and hemoglobin a1c levels.

Through this study gaps in knowledge about health literacy in primary care and endocrinology medical professionals will be identified. In addition, assessment of current health literacy practices among medical professionals in primary care and endocrinology offices will be assessed.

Research Design

A quasi-experimental design was used for this study. The study consisted of a pre-intervention survey, educational intervention, post-intervention survey, and a retrospective chart review. IRB and the healthcare system's research office granted approval for this study.

Setting

The study was performed at a large healthcare system in the central United States. The healthcare system consisted of three endocrinology specialty offices, and 32 primary care practice offices at the time the study took place. Six ambulatory sites were chosen for the study, three endocrinology offices and the three primary care offices with the highest volume of type 2 diabetes encounters between January 1, 2018 and July 31, 2018.

All data collection was performed in the primary investigator's office located within a hospital and office building owned by the healthcare system. All educational interventions were performed at the participant's place of work, the primary investigator's personal office, or the healthcare system's offices. All chart reviews were performed in the PI's private work office.

Sample

The study consisted of two study populations: the healthcare professionals invited to participate in the health literacy educational intervention, and the patients whose charts were retrospectively reviewed.

The first population consisted of medical professionals providing diabetes management and education in an outpatient setting employed in an office included in the study. Inclusion criteria for health care professionals to be invited to participate included nurses, advanced practice nurses, physician assistants, physicians, dieticians, and pharmacists. Healthcare professionals including licensed practical nurses, medical assistants, and other support staff were not included in the study due to the low likelihood of diabetes education being provided by these professionals.

Aim 1: Educational Intervention & Surveys

The healthcare professional study population was obtained by a convenience sample. Employees (full or part-time) who met the inclusion criteria received an invitation via email with a letter explaining the study and what the participants would be expected to do if they chose to participate. A link to a pre-intervention survey was included in the invitation e-mail. Voluntarily clicking on the survey link and completing the survey was considered consent to participate in the study. A total of 56 potential medical professional participants were identified. This population included 17 registered nurses (RN), three registered dieticians (RD), 23 medical doctors (MD), and 13 advanced practice registered nurses (APRN). Of the potential participant population, 13 agreed to participate. This population included eight RNs, three RDs, no MDs, and two APRNS.

Aims 2 & 3: Retrospective Chart Reviews

The second population included patients who were male or female, aged 18 years old and older, with an encounter for type 2 diabetes in either a primary care office or an endocrinology office between the dates of January 1, 2018 and July 31, 2018, and had an ICD-10 code of E11. Exclusion criteria included patients under the age of 18, a diagnosis of type 1 diabetes, steroid-induced diabetes, hyperglycemia, or a diagnosis of gestational diabetes. The second population was used for a retrospective chart review to assess baseline health literacy practices among advanced medical providers. The medical charts were provided by the healthcare system's research office after the PI received IRB approval. The PI received a list of medical record numbers of patients who met the inclusion criteria listed above. A total of 50 charts from each ambulatory office were randomly selected from the list of approximately 800 to 3,000 charts per office.

Methodology

Data Collection

Aim 1: Educational Intervention & Surveys

The survey used for the study, titled *Health Literacy Brief Assessment Quiz* (2015), consisted of ten questions and was created by the Agency for Healthcare Research and Quality (AHRQ); (See Figure 2). The survey questions were designed as multiple-choice, and one open-response item. One question consisted of five multiple-choice items. A total of 14 correct answers were possible, with the open-response item not scored. The pre-intervention and post-intervention surveys were collected electronically using the survey service, Qualtrics (Qualtrics, Provo, UT). Participants were given two weeks to complete each of the pre-intervention and post-intervention surveys. Between the pre and post-survey, an education intervention was

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performed. The educational intervention was also created by the AHRQ and was titled *Health Literacy: Hidden Barriers and Practical Strategies* (2017). The participant's name and email address were assigned a unique identifier. Responses to the survey were only identified by the unique identifier code assigned to the participant, and not by the participant's name, professional title, or job location. Once the researcher received the completed survey, the results, identified by the unique identifier code, were transferred into an SPSS data sheet on the primary investigator's personal password-protected computer with a secure server. All information gathered from this study was kept secure and confidential on the PI's personal work password-protected computer.

Aims 2 & 3: Retrospective Chart Review

The retrospective chart review included male and female patients aged 18 years and above who have been seen in one of the included offices for type 2 diabetes with an ICD-10 code of E11 between January 1, 2018 – July 31, 2018. The healthcare system provided a list of medical record numbers for the chart review of patients who met the inclusion criteria. The data collected did not include any patient personal identifying information. Data collected included: the medical record number (which was de-identified and given a unique code), the office in which the patient was seen (which was de-identified and given a unique code), if the patient received verbal or written education, if the patient's educational preferences were documented, if the diabetes education provided was in congruence with the patient's educational preference, if a health literacy tool was used, and the patient's most recent hemoglobin A1C lab levels. The retrospective chart review also collected demographic information including age, gender, and race.

An equal number of charts were reviewed from each of the six medical offices included in the study. A convenience sample was chosen until a total of 50 charts from each office was

compiled. From the list of medical record numbers provided by the healthcare organization, 50

charts were randomly selected to be reviewed from each of the medical offices, for a total of 300

charts used for the data collection of the study. A total of 10,747 charts were sent from the

healthcare organization. A range of 865 – 3,012 were sent per office. Of those a total of 356 were

reviewed and 56 were discarded due to patient not meeting inclusion criteria. Profession of the

healthcare professional providing care to the patients was not recorded, however all patient

encounters were with an advanced practice registered nurse or medical doctor. Only the primary

investigator was in the office during the time the charts were screened. An audit tool was stored

on the PI's password-protected personal computer with a secured network. There were no patient

identifiers kept on this worksheet, and each medical record number was assigned a unique

identifier. A separate unique identifier for each medical office was also assigned. A separate

worksheet with the medical record number, and medical office was used to link to the unique

identifier. This worksheet was kept apart from the data and accessed only by the PI. It was kept

in an authenticated, secure, firewall-protected research folder at the healthcare system in which

the study was conducted that was only accessible to the PI, Information Services representatives,

and the UK School of Nursing Academic Partnership network administrators trained to establish

the file folder access for the students. The collection of data began following approval from the

UK Medical IRB and the healthcare systems office of research administration. No data was

requested or collected prior to obtaining IRB approval.

Education Intervention

An evidence-based health literacy educational session was provided by the PI to each

study participant. The education provided to each participant was titled *Health Literacy: Hidden*

Barriers and Practical Strategies (2017), in PowerPoint form and was created by the Agency for

Healthcare Research and Quality (AHRQ). In addition to the PowerPoint, the talking points used

for the presentation were obtained from the AHRQ. The educational session lasted

approximately 30 – 45 minutes. Paper copies of the presentation PowerPoint slides were

provided to each participant as well.

Educational sessions were offered as one-on-one sessions, electronic PowerPoint video

(narrated by the PI) sent via email, or as a group session. Participants had a four-week time

frame from when they completed the pre-test to complete the education session. The method of

education provided to the participant was recorded. Of the thirteen participants, three received

the education as a one-on-one session, two as an e-mail of PowerPoint video, and eight as part of

a group session.

Data Analysis

Data was analyzed using descriptive statistics, including: frequency distributions and

cross tabulations. A paired t-test was also used for data analysis. All analysis was conducted

using SPSS version 24, and all charts were made in Microsoft Word and Microsoft Excel. The

paired t-test was used to compare pre-intervention and post-intervention survey scores. Cross

tabulations using the chi-square were used to evaluate the data collected from the chart review to

evaluate for correlations between education provided in the different offices, and if education

being provided correlated with lower, more controlled, Hemoglobin A1C readings.

Results

Study Aim 1: Assess health literacy knowledge among primary care and endocrinology medical professionals, and evaluate the effect of a health literacy educational intervention on professionals' knowledge

For the study, 56 healthcare professionals were invited to participate in a pre-intervention survey, health literacy education session, and a post-intervention survey. Of the 56 healthcare professionals invited, 13 participated, for a 23% participation rate. This population included eight RNs, three RDs, two APRNS, and zero MDs. Survey scores were evaluated in aggregate and not by professional title or location of practice due to small sample size. All 13 participants completed the pre-intervention survey, health literacy education session, and the post-intervention survey. The pre-intervention and post-intervention survey were identical. The range of possible scores for the survey ranged from zero to fourteen. A paired t-test was used to compare the means of the pre and post-intervention surveys. Overall, participants had a pre-intervention survey mean score of 10.3 (SD = 0.9), and a post-intervention survey mean score of 10.8 (SD = 1.1), with a p-value of 0.17 indicating that there was a non-significant increase in overall score. (See Table 1.)

There was an open response item on the survey asking participants, "What strategies could all of us adopt to minimize barriers and misunderstanding for patients?" (*Health Literacy Brief Assessment Quiz,* AHRQ, 2015). Most participants chose to respond to this prompt in the pre and post survey. In the pre-intervention ten out of thirteen participants responded with the following comments: "Ask patient their education level," "Make questions regarding health literacy a priority before trying to educate," "Provide good patient assessment explain things to patient, don't assume the patient understanding and explain things in terms the patient can

understand," "Have them repeat to us in their words what we just discussed with them," "Teach back method," "Have standardized verbiage that all healthcare providers use," "Always ask if the patient can read or write," "Have patience," and "Repeat or teach back." On the post-intervention survey eight out of the thirteen participants answered this question with very similar responses to the pre-intervention survey.

In general participants answered most questions correctly. However, the three most frequently missed questions on the survey were related to patient and educational material reading levels. The most frequently missed question was, "What is the average reading level of US adults?" The correct answer is eighth to ninth grade. Pre-education 15.4% of participants answered correctly, and post-education 23.1% of participants answered correctly. 69.2% of participants underestimated the average reading level of US adults, estimating reading levels to be between 4th and 7th grade. Another frequently missed survey question was, "What is the grade level at which health-related information (like a diabetes brochure) is typically written?" with a correct answer of tenth grade or higher. For both pre and post-education, 23.1% of participants answered correctly. The majority of participants, 69.2%, underestimated the grade level at which health-related information is typically written, with 6 out of 13 participants answering 4th to 5th grade. The third question that was frequently missed on the survey was, "What is the best reading level for written materials used with patients?" with a correct answer of fifth to sixth grade. Pre-education 30.1% of participants answered correctly and post-education 38.5% of patients answered correctly. Just over half of the participants, 53.8%, estimated the best reading level for written materials used with patients to be 3rd to 4th grade.

Study Aim 2: Assess and compare health literacy practices among primary care and endocrinology providers who treat patients with type 2 diabetes

For this study, six outpatient medical offices were included. The healthcare system in which the study was conducted has three endocrinology specialty offices, all of which were included in the study. At the time the study was conducted there were 32 primary care offices in the healthcare system. The three offices with the most type 2 diabetes office encounters were included in the study. Fifty charts were randomly selected and were reviewed from each office, for a total of 300 charts.

The patients seen in the primary care office ranged in age from 20 – 93 years with a mean age of 65 (SD = 13.34). Similarly, patients in the endocrinology offices ranged in age from 22 – 88 years with a mean age of 60 (SD = 11.97). The distribution of gender and race was similar between primary care and endocrinology offices. Males accounted for 30.6% of the population in primary care offices, and 27.3% in endocrinology offices. Females accounted for 69.3% of the population in primary care offices, and 72.6% in endocrinology offices. Patients in the primary care offices were 74% Caucasian, 24% African American, 1.3% Hispanic, and 0.7% Asian. Patients in the endocrinology offices were 60% Caucasian, 39.3% African American, and 0.7% Asian.

The chart review audited whether the provider documented the provision of diabetes education to the patient (verbal or written), if the patient's education preference was documented, and if use of a health literacy tool was documented. Out of the 300 charts reviewed, no patients had a documented education preference. The use of a health literacy tool was also documented zero times. Diabetes education (verbal or written) was documented for 59 out of 150 (39.3%) of patients in primary care offices, and for 142 out of 150 (94.7%) in endocrinology offices, which is a significant finding (*p*-value = <0.001). (Please refer to Table 2 and Figure 1).

Study Aim 3: Describe the relationship between health literacy practices and hemoglobin a1c levels

The same population and medical charts reviewed for Aim 2 were reviewed for Aim 3. Hemoglobin a1c levels were considered controlled if they were equal or less than 7.0% (53 mmol/mol), in accordance with the American Diabetes Association (2018). In the three primary care offices, 86 out of 150 (57.3%) patients had controlled hemoglobin a1c levels, compared to 55 out of 149 (36.9%) of patients seen in the three endocrinology offices, which was a significant difference (p-value = <0.001). There was no correlation between if education was provided and controlled hemoglobin a1c levels. (Please refer to Table 2).

Discussion

This study evaluated a multidisciplinary group of healthcare professionals' health literacy knowledge through a pre-intervention survey, health literacy education session, and a post-intervention survey. A limitation to this study aim was a small sample size of 13 participants and a 23% participation rate. The healthcare professionals who participated had a non-significant increase in score on the health literacy survey post-education intervention. Through the pre-education survey and post-education survey, gaps in healthcare professional knowledge were identified. Healthcare professionals are underestimating patient reading levels, implying that health care professionals assume their patients' health literacy levels are lower than they actually are. This is could mean healthcare professionals are compensating the perceived health literacy levels of their patients, and are therefore not educating to or above their level of understanding. Healthcare professionals also believed the healthcare materials provided were above their patients' health literacy level, and therefore were likely compensating in favor of the patient with their verbal education. Healthcare professionals also underestimated the optimal reading level for

educational materials, and thus it can be concluded that the healthcare professionals are not providing educational materials above the patients' literacy level, but below. Healthcare professionals educating below the patient's literacy level is a positive finding for practice. By providing more clear and simple instructions, patients are likely to have greater understanding of their instructions and thus improved health outcomes.

A key finding identified on the open-response item on the survey is that healthcare professions are able to identify and recognize strategies they can adopt to minimize barriers and misunderstanding for patients. Recommendations for future practice are that every ambulatory healthcare professional be required to receive health literacy education during orientation and for healthcare systems to implement universal health literacy precautions. Training for the healthcare system and the healthcare professionals could be provided by The Agency for Healthcare Research and Quality's Health Literacy Universal Precautions 2nd Edition Toolkit, that was used in this study. Positive feedback was received about the educational resources and participants verbalized not only appreciation for the education, but also the importance for all healthcare providers to receive it. Providing healthcare professionals with health literacy education is essential for the appropriate verbal and written education to be provided to patients. Future research could assess healthcare professional attitudes toward health literacy practices as well as compliance with health literacy practices.

Through assessing health literacy practices among endocrinology and primary care advanced healthcare providers, it was identified that formal health literacy tools are not being used, and patient education preference is not being documented. This is not surprising, as it is currently inconclusive as to whether the use of such tools is beneficial in an ambulatory setting.

Some studies have shown that the use of formal health literacy tools can make patients feel stigmatized and embarrassed about their literacy and numeracy abilities (Jordan, L.,2016).

This study also found that endocrinology offices are significantly more likely to document written and/or verbal diabetes education provided during the visit. This could be due to the fact that endocrinology offices have a more standardized documentation process due to seeing higher volumes of type 2 diabetes patients. Another reason for the difference could be that patients at endocrinology offices have a more focused visit on type 2 diabetes, whereas primary care office patients are more likely to be seen for multiple conditions.

There were several limitations to this aspect of the study that were identified. One being that there were only six ambulatory offices reviewed. Also, only 50 medical charts were reviewed per office out of a possible 865 – 3,012 depending on the office due to time constraints. Other limitations included the possibility that providers are providing written or verbal diabetes education and simply not documenting. Primary care providers often see patients for multiple chronic diseases and could have educated on a different medical condition on that visit, but did not do so for type 2 diabetes.

Previous research indicates that patients have decreased retention of information related to follow-up and treatment instructions due to focus on the diagnosis (Kessel, 2003). In addition, research has shown patients only comprehend and recall approximately half of the information discussed during clinical visits (Hersh, Salzman, & Snyderman, 2015). To bridge the gap of missed information, for future practice it is recommend all providers use health literacy precautions with their patients, such as simple and plain language, the teach-back method, and using written education as a supplement to verbal education. Clear healthcare professional-to-patient communication is an important aspect of medical care (Hersh, Salzman, & Snyderman,

2015). Further research is needed to establish medical professional buy-in in adopting universal health literacy precautions in a large healthcare system.

This study found no identifiable relationship between written or verbal diabetes education provided and controlled hemoglobin a1c levels. The lack of relationship could be due to multiple reasons; such as: small sample size, lack of documentation, patient retention of the education provided, if the patient read the written education materials, and the time between the education and the time of the hemoglobin a1c laboratory draw. For this study, the most recent hemoglobin a1c level in the electronic medical record was used, as it was envisioned that the most recent level would have been collected after the type 2 diabetes office encounter. Future research could assess a pre-diabetes education and a post-diabetes education hemoglobin a1c level to evaluate a direct relationship between hemoglobin a1c level and diabetes education.

Conclusion

Gaps in current health literacy practices in a large healthcare system regarding health literacy were identified in the course of this study. Healthcare professionals were found to be knowledgeable on health literacy, and verbalized appreciation about the value they found in the health literacy education they received. The study also confirmed that health literacy tools are not currently being used to evaluate health literacy level, nor was patient education preference documented by health care professionals in primary care and endocrinology ambulatory settings. The literature on the effectiveness of formal health literacy tools is inconclusive, and the use of formal tools is currently not recommended in the ambulatory setting. Instead, the adoption of universal health literacy precautions provides healthcare systems with the best means of improving patient health literacy. Many opportunities for future health literacy research exist. The findings from this study support the need for universal health literacy precautions, such as

adopting the AHRQ's Health Literacy Universal Precautions Toolkit. Health literacy specialists

within the organization should identify stakeholders in this endeavor and construct a taskforce to

spearhead this project.

Appendix 1

Health Literacy Brief Assessment Quiz

Health Literacy Brief Assessment Quiz

We would like to get a sense of the knowledge and understanding you have about health literacy. Please complete this brief quiz that assesses some key facts about health literacy.

1. Limited health literacy is associated with:
   - ☐ A. Higher mortality rates
   - ☐ B. Lower levels of health knowledge
   - ☐ C. Greater use of inpatient and emergency department care
   - ☐ D. Poor medicine adherence
   - ☐ E. B and D
   - ☐ F. All of the above

2. You can tell how health literate a person is by knowing what grade he or she completed in school.

   - ☐ A. True

   - ☐ B. False

3. Which of the following skills are considered to be components of health literacy?
   - ☐ A. Ability to understand and use numbers
   - ☐ B. Reading skills
   - ☐ C. Speaking skills
   - ☐ D. Ability to understand what is said
   - ☐ E. Writing skills
   - ☐ F. All the above

4. Being anxious affects a person's ability to absorb, recall, and use health information effectively.

   - ☐ A. True

☐ B. False

5. What is the average reading level of U.S. adults?

   ☐ A. 4th-5th grade

   ☐ B. 6th-7th grade

   ☐ C. 8th-9th grade

   ☐ D. 10th-11th grade

   ☐ E. 12th grade

6. What is the grade level at which health-related information (like a diabetes brochure) is typically written?

   ☐ A. 4th-5th grade

   ☐ B. 6th-7th grade

   ☐ C. 8th-9th grade

   ☐ D. 10th grade or higher

   ☐ E. 11th grade or higher

   ☐ F. 12th grade or higher

   ☐ G. college level

7. What is the best reading level for written materials used with patients?

   ☐ A. 3rd-4th grade

   ☐ B. 5th-6th grade

   ☐ C. 7th-8th grade

   ☐ D. 9th-10th grade

   ☐ E. 11th-12th grade

8. To use good health literacy practices, staff and clinicians should use which of the following words/phrases when talking to or writing instructions for a patient or family member?

Circle the word/phase in either Option 1 or 2 in each row		
Option 1	**OR**	**Option 2**
a.	Bad	OR	Adverse
b.	Hypertension	OR	High Blood Pressure
c.	Blood Glucose	OR	Blood Sugar
d.	You have the flu.	OR	Your flu test was positive.
e.	The cardiologist is Dr. Brown.	OR	The heart doctor is Dr. Brown.
f.	Your appointment is at 11:00 AM. Check in 20 minutes early.	OR	Arrive at 10:40 AM to check in.

9. It is a good health literacy practice to assume that each patient you communicate with has limited health literacy.

☐ A. True

☐ B. False

10. What strategies could all of us adopt to minimize barriers and misunderstanding for patients?

_____

_____

_____

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Table 1

	Pre-intervention *Mean* (SD)	Post-intervention *Mean* (SD)	*p*
Health Literacy Survey Score	10.3 (0.9)	10.8 (1.1)	.17

Table 2

	Primary Care (*n* =150) *n* (%)	Endocrinology (*n* =150) *n* (%)	*p*
Age, *mean* (SD)	20 - 93 years *65* (13.34)	22 - 88 years *60* (11.97)	0.344
Gender Male Female	46 (30.6%) 104 (69.3%)	41 (27.3%) 109 (72.6%	0.525
Race Caucasian African American Hispanic Asian	111 (74%) 36 (24%) 2 (1.3%) 1 (0.7%)	90 (60%) 59 (39.3%) 0 (0%) 1 (0.7%)	0.028
HL Tool Used Yes No	0 (0%) 150 (100%)	0 (0%) 150 (100%)	--
Educ Pref Recorded **Yes** **No**	0 (0%) 150 (100%)	0 (0%) 150 (100%)	--
Education provided Yes No	59 (39.3%) 91 (60.7%)	142 (94.7%) 8 (5.3%)	<.001
A1C controlled Yes No	86 (57.3%) 64 (42.7%)	55 (36.9%) 94 (63.1%)	<.001

Figure 1