Low Health Literacy Interventions and Resources Used At Community Health Centers Using Decision Support from the Care Model

Cynthia Schaefer

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LOW HEALTH LITERACY INTERVENTIONS AND RESOURCES USED AT COMMUNITY HEALTH CENTERS USING DECISION SUPPORT FROM THE CARE MODEL

A Dissertation
Submitted to the School of Nursing

Duquesne University

In partial fulfillment of the requirements for
the degree of Doctor of Philosophy

By
Cynthia T. Schaefer

July 2015
LOW HEALTH LITERACY INTERVENTIONS AND RESOURCES USED AT COMMUNITY HEALTH CENTERS USING DECISION SUPPORT FROM THE CARE MODEL

By

Cynthia T. Schaefer

Approved July 20, 2015

Linda Goodfellow, PhD, RN, FAAN
Professor of Nursing
(Committee Chair)

Alison Colbert, PhD, PHCNS-C
Associate Professor of Nursing
(Committee Member)

Michael Quinn, PhD
Senior Research Professional
(External Committee Member)

Mary Ellen Glasgow, PhD, RN, FAAN
Dean, School of Nursing
Professor of Nursing

Rick Zoucha, PhD, APRN-BC, CTN-A, FAAN
Chair, Advanced Role and PhD Program
Professor of Nursing
ABSTRACT

LOW HEALTH LITERACY INTERVENTIONS AND RESOURCES USED AT COMMUNITY HEALTH CENTERS USIND DECISION SUPPORT FORM THE CARE MODEL

By
Cynthia T. Schaefer
July 2015

Dissertation supervised by Dr. Linda Goodfellow

Community health centers (CHCs) serve the largest portion of the medically underserved patients in the United States. Little health literacy research has been conducted in the community health center setting. The Care Model, more specifically the elements of the health care organization, decision support, and productive interactions, guided this study. The purpose of the study was to examine how the characteristics of the CHC (location, size, provider mix and providers reporting of patient language) along with health literacy decision support strategies (formal training and programs) are related to productive interactions between the health care provider (HCP) and the patient when low health literacy intervention are used. Methods. Data from a study that examined HCP perceptions of health literacy in CHCs were used to conduct a secondary analysis. This secondary analysis used a descriptive correlational design. Results. Results indicated that rural HCPs were significantly more likely to assess their patients for low
health literacy ($p = 0.04$). HCPs from urban CHCs were significantly more likely to have a social worker ($p = 0.04$). HCPs from urban CHCs used low health literacy education materials ($p = 0.04$) for non-English speaking patients. Results of the multiple regression found the set of predictors were significant ($p = 0.000$) and were able to explain 60% of the variance. One variable made a significant contribution; individual intense patient education ($p = 0.01$). If the CHC had intensive, individualized patient education sessions the health care providers were significantly more likely to use low health literacy interventions ($p = 0.001$). **Discussion.** The Care Model can provide support to the CHC organization in developing health literacy decision support strategies. The implementation of health literacy interventions such as individualize patient education can assist the HCP in being prepared and proactive in the care they provide and can help promote the CHC patients to be involved and activated. These decision support strategies could assist in improving the patients’ health outcomes.
DEDICATION

To my best friend and beloved, my husband Doug,

with love and gratitude.
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I would like to thank my family for all of their love and support. To my husband Doug for making sure I always had what I needed and kept me moving forward. To my sons Greg and Tim thank you for your support and putting up with me during my doctoral studies. Thank you to my parents, sister, and brothers who have supported me in many different ways.

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Chapter 1

1.1 Introduction

The scope of low health literacy issues faced by health care providers in a primary care setting is significant (Heinrich, 2012). As the awareness of patients with low health literacy (LHL) continues to increase, it is essential for health care providers (HCPs) to recognize patients (in their practice) who have problems with health literacy (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). The HCP needs to be aware that patients with LHL access preventative services less often and experience poorer health outcomes (Scott, Gazmararian, Williams, & Baker, 2002). Knowledge of a patient’s LHL is essential in developing a plan of care that can be understood by the patient and should be an important component of the HCP’s practice (Artinian, Lange, Templin, Stallwood, & Hermann, 2002). Community health centers (CHCs) need to provide HCPs with the resources necessary to provide patients with effective care. However, care cannot be effective unless health literacy is taken into account. A closer look was taken at the LHL interventions and resources used at CHCs. A secondary analysis was conducted using data collected in a survey that initially examined HCPs’ perceptions of LHL and their effects on patients (Schlichting et al., 2007). This secondary analysis examined whether the reported LHL interventions, formal training, health literacy programs and assessments used by HCPs with their patients in CHC settings differed in regard to geographical location (urban versus rural), the size (small, medium, or large), provider mix (physician, registered nurse, and physician assistant), and the proportion of CHC patients whose primary language is not English.

1.2 Background of the Study

The ability to identify patients with LHL is important if the HCP is to effectively communicate a plan of care with patients. Without a clear picture of the patient’s health literacy status, the HCP is leaving the patient vulnerable to misunderstandings that can impact
medication administration, diagnostic testing, and self-management (Pawlak, 2005). Patients with low or marginal health literacy report poorer health status, insufficient understanding of their health status, and are at greater risk for hospitalization (Baker, Parker, Williams, Clark, & Baker, 1998).

Several major issues have been identified that influence health literacy including: the inability of 25% of Americans to speak, read, and write in English; barriers in communication in regard to confusing terminology and written material used by HCPs; socioeconomic status, age, race, and ethnic background; geographical location (inner city, urban, and rural); and type of health insurance used (with individuals with low health literacy disproportionately using Medicare and Medicaid insurance) (Paasche-Orlow, Parker, Gazmararian, Nielsen-Bohlman, & Rudd, 2005; Williams, Davis, Parker, & Weiss, 2002). These barriers have led to poorer communication between the HCP and the patient which can lead to poor health outcomes.

Often, HCPs presume to know their patients’ health literacy status based on appearances or education. However, many well dressed, articulate, and intelligent patients have been found to have marginal or low health literacy skills (Davis, Berkel, et al., 1998). In addition, patients with LHL tend to guard this information very closely. Parikh, Parker, Nurss, Baker, and Williams (1996) found that 67% of patients with LHL had not shared this information with their spouses and 19% had never revealed this information to anyone. If patients do not share their LHL status with their HCP, the HCP may not be aware of this barrier to care. Therefore, lack of awareness on the provider’s part may contribute to the misunderstandings and miscommunication between the HCP and the patients served at the CHCs.

Race and ethnic background are also related to LHL as shown in the 2003 National Assessment of Adult Literacy study (NAAL). In this study more than a quarter of white adults
had LHL (defined as basic or below basic) compared to over half of African Americans, nearly half of Alaskan and Native Americans, and more than two thirds of Hispanic/Latino Americans (Kutner et al., 2006). Several studies imply that the possible reason for the relatively LHL in the Hispanic/Latino Americans may be attributed to fewer opportunities for educational achievement (Gazmararian et al., 1999; Lee, Bender, Ruiz, & Cho, 2006; Parker, Baker, Williams, & Nurss, 1995). This concern is further compounded by the fact that the United States (U.S.) Census Bureau reports the majority of the nation’s counties are becoming majority-minority, with more than 50 percent of the U.S. population made up of people other than single-race, non-Hispanic whites. Included in the report was the increase in the Hispanic/Latino population by 3.1 percent, to 48.4 million, (from 2008 to 2009). This makes the Hispanic/Latino population both the largest and fastest-growing minority group in the U.S. (Bureau, 2009). Health care providers who practice in CHC settings need to understand that regardless of race or cultural background, the potential for LHL can be present. Therefore, the CHC organizations should assist the HCPs with the appropriate resources and tools to assess and address LHL.

Patients must be able to access information, communicate with HCPs about their illness, sign consent forms, and comprehend treatment options and self-management strategies (Klein, 2009; Shortell & McCurdy, 2009). Patients are expected to acquire the knowledge required to manage their diseases as well as the multifaceted aspects of self-management. In addition, patients with LHL are not as likely to understand or participate in disease prevention and health promotion offerings (Gazmararian, Williams, Peel, & Baker, 2003; Scott et al., 2002). A poor understanding of health, incorrect medication usage, poor health status, and hospitalization rates of patients with LHL translates into higher health care costs (Weiss, 2007). It is imperative that CHCs provide the health center staff with appropriate training in LHL, including the skills
needed to identify a patient’s health literacy level and knowledge of interventions and supportive services necessary to help patients with LHL. Availability and use of resources may provide HCPs with a better understanding of their patients’ health literacy status, making sure the information needed is aligned with the information provided. The use of LHL interventions will help facilitate a productive interaction between the HCP and patient which may lead to improved health outcomes for the patient.

1.3 Purpose of the Study

The purpose of this secondary analysis was to examine how characteristics of the health care organization (geographic location, size, provider mix, and percentage of non-English speaking patients seen by providers) along with decision support (formal training and health literacy programs) are related to productive interactions between the provider and the patient when a variety of health literacy interventions are used. Little is known regarding LHL support or the use of specific LHL interventions at CHCs. Of the 49 CHCs that participated in the original survey, 21 CHCs were classified as rural and 28 CHCs as urban. The similarity in numbers of the two groups of CHCs provided an opportunity to study the use of different LHL interventions employed by HCPs in relation to the geographic setting. The diversity of the participating CHCs regarding the primary language of the patients (0 to 100%) also provided an opportunity to examine the possible difference in LHL interventions used by the HCPs in the CHC setting depending on whether the patient spoke Spanish as their primary language or English (Schlichting et al., 2007).

In the original study, among the HCPs who served non-English speaking patients, the percentage of non-English speaking patients in their respective patient panels ranged from 5 to 55 percent (Schlichting et al., 2007). The variability of the responses regarding patient language
presented the chance to study the LHL interventions that were used in CHCs. This further investigation provided descriptive information of the LHL interventions used by CHCs and whether the CHCs differed from one another in regard to the interventions used.

The original study consisted of 701 HCPs from 49 CHCs in the Midwest region of the US; the health care providers were all members of the MidWest Clinicians Network (MWCN). Health care providers included physicians, nurse practitioners, physician assistants, registered nurses, dentists, and dental hygienists. The purpose of the original study was to examine HCPs’ estimates of the prevalence of LHL, HCPs’ perceptions of LHL’s effects on patients, and HCPs’ opinions and experiences regarding interventions to help their patients overcome LHL. A total of 333 eligible respondents completed and returned surveys for a response rate of 47.5%. The majority of the respondents were either physicians (44%) or nurse practitioners (20%). The estimated prevalence of inadequate health literacy ranged widely across centers for both English and Spanish speaking patients (0-100%), with the median prevalence estimated by the survey respondents as 40% and 50% respectively (Schlichting et al., 2007).

The intent of this secondary analysis was to examine the reported LHL interventions, formal training, health literacy programs, and assessments in existence by HCPs with their patients in the CHC settings and the possible differences related to geographical location, center size, type of HCPs, and the percentage of patients in their individual patient panels who are non-English speaking. The analysis provided information about the possible differences in the use of LHL interventions at CHCs in the Midwest section of the U.S. This information may also be helpful in developing decision support strategies to assist the CHCs in providing education and support to the HCPs caring for patients who are low health literate.
1.4 Research Questions

The data obtained from the primary study provided an opportunity to ask further questions that were evaluated using a secondary analysis approach. The research questions and hypotheses for this secondary analysis were as follows:

1. What are the relationships between health literacy assessment, formal training, and health literacy programs and community health center characteristics of geographical location, size, and the proportion of non-English patients seen by providers?

1.1. Health care providers in urban community health centers will report the existence of more assessment tools for patients with low health literacy than will health care providers in rural community health centers.

1.2. Health care providers in large community health centers will report having the existence of more assessment tools for patients with low health literacy than will health care providers in small community health centers.

1.3. Health care providers in community health centers that report a high proportion of non-English patients seen by providers will report the existence of more assessment tools for patients with low health literacy than will health care providers in community health centers that report a high proportion of English patients seen by providers.

1.4. Health care providers in urban community health centers will report the existence of formal training regarding low health literacy than health care providers in rural community health centers.

1.5. Health care providers in large community health centers will report the existence of formal training regarding low health literacy than will health care providers in small community health centers.
1.6. Health care providers in community health centers that report a high proportion of non-English speaking patients seen by providers will report the existence of formal training regarding low health literacy than will health care providers in community health centers that report a high proportion of English speaking patients seen by providers.

1.7. Health care providers in urban community health centers will report the existence of more low health literacy programs than will health care providers in rural community health centers.

1.8. Health care providers in large community health centers will report the existence of more low health literacy programs, like the use of a low health literacy specialist, than will health care providers in small community health centers.

1.9. Health care providers in community health centers that report a high proportion of non-English speaking patients seen by providers will report the existence of more low health literacy programs that will health care providers in community health centers that report a high proportion of English speaking patients seen by providers.

2. What are the relationships between reported low health literacy interventions and community health center characteristics of geographical location, size, and proportion of non-English patients seen by providers?

2.1. Health care providers in urban community health centers will report using a larger number of low health literacy interventions than will health care providers at rural community health centers.

2.2. Health care providers in larger community health centers will report using more low health literacy interventions, like reviewing instructions carefully with patients, than will health care providers at small community health centers.
2.3. Health care providers that report a high proportion of non-English speaking patients seen by providers will report using more low health literacy interventions than will health care providers in community health centers that have a high proportion of English speaking patients seen by providers.

3. Is the use of low health literacy interventions influenced by the community health center’s geographical location, size, availability of low health literacy programs, and the primary language of the patient population served by individual providers?

3.1. Provider type, community health center’s geographical location, size, the existence of low health literacy programs, and the primary language of the patient population served by individual providers will be strong predictors of the use of low health literacy interventions in this population.

1.5 Conceptual Framework

The Care Model recognized that quality care is based on the interactions between the HCP and the patient (Appendix A) (Schaefer & Davis, 2004). This model consisted of six elements including the health care organization, clinical information systems, decision support, delivery system design, self-management support, and community (Wagner et al., 2001). The cornerstone of this model is evidence-based interventions that support each of the elements. These six elements come together to provide productive interactions between a prepared, proactive practice team and an informed activated patient to improve health outcomes (Wagner, Davis, Schaefer, Von Korff, & Austin, 1999).

Specifically, the health care organization, decision support, and productive interaction as it pertains to the Care Model (Appendix B) guided this study. The focus of the decision support practice element focus is to improve medical decision making and patient care (Gugiu, Westine,
Coryn, & Hobson, 2013). This practice element targets changes to the HCP’s behavior to improve patient care (Pasricha et al., 2013). The decision support is accomplished by the CHC organization that provides up-to-date resources and evidence-based guidelines to educate and assist the CHC staff. Decision support presents a standardization of the practice and provides the training needed to assure quality (Schaefer & Davis, 2004). The evidence based guidelines used at the CHC should be consistent with scientific evidence and patient preferences. Decision support guidelines should be embedded into daily practice and should be shared with the patients to encourage productive interaction (Dancer & Courtney, 2010).

1.6 Definition of Terms

Health literacy.

There are several published definitions of health literacy that range from the overly broad to the very specific. For this study, health literacy was defined as it was in the original study. Thus, the definition of health literacy used in this study is as follows: health literacy is the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Office of Disease Prevention and Health Promotion, 2005).

Low health literacy assessment.

For the purposes of this study LHL assessment was defined as the testing of a patient’s ability to read and comprehend health related information to accomplish specific tasks (Doak, Doak, & Root, 1996; Schwartzberg, Cowett, Vangeest, & Wolf, 2007). Low health literacy assessment information for this study was obtained from responses to question five of the Health Literacy Survey “… please indicate how often you do each of the following to assess health literacy when you are personally caring for patients.” (Appendix C).
Low health literacy programs.

Low health literacy programs for this study were defined as programs for health care providers that focus on enhancing the patient’s understanding of health related information. Low health literacy programs information for this study were obtained from the responses to question eight of the Health Literacy Survey “Please indicate in the table below which type of low health literacy program(s) or intervention(s) your health center has instituted (if any) and how effective you believe the intervention has been.” (Appendix C).

Low health literacy interventions.

Low health literacy interventions were defined for this study as the use of educational interventions designed to improve health outcomes of patients with LHL. The LHL interventions addressed in this survey are classified into personal contact and written material. Low health literacy intervention information for this study was obtained from the responses to question seven of the Health Literacy Survey “Please select the special methods or techniques you use to assist your patients who have low health literacy.” (Appendix C).

Health care provider type.

For the purpose of this study, health care provider type included physicians (doctor of medicine or osteopathy), registered nurse (including advance practice nurses, nurse practitioners, clinical nurse specialists, and staff nurses), and physician assistants. Health care provider type information for this study was obtained from the responses to question thirteen of the Health Literacy Survey “What is your current position at the health center?” (Appendix C).

Community health center.

In this study a community health center was defined by the same criteria required for federal funding and include: 1) located in a federally designated medically underserved area; 2)
have a nonprofit tax exempt status; 3) provide comprehensive primary health care services, referrals, and other services to facilitate access to care; 4) be governed by a board of directors in which 51% of members are patients from the health center; 5) provide health services to all without regard to the patient’s ability to pay (Health Resources and Services Administration, n.d).

**Rural community health center.**

The definition for a rural area is defined by the U.S. Census Bureau (2014). “Rural” is classified as all territory, population, and housing units located outside of urban areas (U.S. Census Bureau, 2014). Geographical information regarding the location of the CHC for this study was obtained from the responses to question twelve of the Health Literacy Survey “Is your health center in a rural or urban location?” (Appendix C).

**Urban community health center.**

An urban area is determined by boundaries. Qualifications include a census population of at least 50,000 or more or an Urban Cluster of at least 2,500 and less than 50,000 people (U.S. Census Bureau, 2014). Geographical information regarding the location of the CHC for this study was obtained from the responses to question twelve of the Health Literacy Survey “Is your health center in a rural or urban location?” (Appendix C).

**Community health center size.**

The community health center size was based on the number of individual patients seen by the health center in a given year. A small size CHC is one that serves less than 5,000 patients per year. A medium size CHC serves between 5,000 and 10,000 patients per year, and a large CHC serves over 10,000 patients per year (Cunningham, Lara, & Shin, 2011). The information regarding CHC size was not part of the original survey, which was conducted in 2006. The
information pertaining to CHC size was obtained from the 2006 Uniform Data System Report. The CHC was matched and coded into the database while keeping the identities of the CHCs blinded to the study investigator.

**Formal training.**

For this study formal training referred to a specific course of instruction that was designed with specific objectives of learning pertaining to health literacy. Formal training information for this study was obtained from the responses to questions six and eight of the Health Literacy Survey: question six “Did you receive any formal training specific to dealing with patients with low health literacy?” and question eight “Please indicate in the table below which type of low health literacy program(s) or intervention(s) your health center has instituted (if any) and how effective you believe the intervention has been.” (Appendix C).

1.7 Assumptions

The following assumptions were made in this study:

1. Community health centers that have provided formal health literacy training and LHL interventions to their HCPs have productive interactions with their patients and have improved health outcomes.

2. The data collected in the original study has been reliably coded for secondary analysis by the original researchers at the University of Chicago and will be sufficient to answer the research questions.

3. The HCPs responses on the “Health Literacy Survey” are valid, true, and honest.

1.8 Limitations

When using secondary analysis, the researcher needed to consider the lack of control over how the data was collected and the sampling frame (Brown & Semradek, 1992). The data base is
restricted by time and history. Based on these limitations, the research questions needed to be matched carefully with appropriate methods of analysis to control for the limitations of an existing data set (Young & Ryu, 2000).

There are limitations within the survey. One limitation is that the original survey did not elicit information about the native language of the provider and their ability to speak or understand Spanish. Not having this information limited the understanding of the effect the language of HCPs has on the use of LHL interventions. The responses to survey question seven regarding LHL interventions were another limitation to this study. The responses include LHL interventions were limited to personal contact interventions, written material interventions, other interventions than those listed, or nothing at all. Low health literacy interventions have been categorized into one of four different areas: personal contact, use of computer programs, a multi-prong approach and written material that has a fifth grade reading level (Schaefer, 2008). Because the survey did not include all of the possible LHL interventions the survey choices may have affected the results.

1.9 Significance to Nursing

Knowledge of patients’ health literacy is of increasing importance as patients are directed to navigate the health care system. The ability to identify patients with LHL is imperative if the nurse, as well as all types of HCPs, is going to be an effective member of a prepared, proactive practice team. The nurse in many instances is the first professional to interact with the patient and teach them about their treatments and/or medications. Without a clear picture of the patient’s health literacy status, misunderstandings about medication administration, diagnostic tests, and self-management can occur (Pawlak, 2005). Patients with low or marginal health literacy report poorer health status and insufficient understanding of their health status. They are also at greater
risk for hospitalizations (Baker, Parker, Williams, Clark, & Nurss, 1997). Because CHCs experience significant clinical vacancies and turnover rates it is crucial that the CHC leadership provide health literacy tools and intervention strategies to the staff (National Association of Community Health Centers, 2009a; Savageau, Ferguson, Bohlke, Cragin, & O'Connell, 2011; Singer, Davidson, Graham, & Davidson, 1998). The use of the health literacy tools and interventions assure that there is a prepared, proactive, practice team despite lack of continuity of HCPs.

Further evidence can be found in studies that examined knowledge of chronic disease. In a Los Angeles diabetes center, 50% of those with LHL could not describe symptoms of hypoglycemia, compared to 94% of the patients with adequate health literacy (Schillinger et al., 2002). Identification of patients with LHL is additionally hindered by the fact that many of these patients go to great lengths to conceal the problem due to shame or feelings of inferiority (Prasauskas & Spoo, 2006). Therefore, health literacy rates in existing studies may be under-estimating the actual prevalence of LHL and may not be reflective of the true magnitude of this problem among the general population. With the variable rate of perception of LHL reported in the original study, the actual LHL rate of patients in health centers may be higher (Schlichting et al., 2007). When providing health education nurses and other HCPs need to consider the health literacy status of their patients at each encounter.

Difficulty identifying patients with LHL has been well documented (Baker et al., 1997; Gazmararian et al., 1999; Kalichman et al., 2000; Williams, Baker, Parker, & Nurss, 1998). Many HCPs do not realize that most patients, even those who are considered highly educated, have difficulty understanding medical jargon (Berkman et al., 2011). Health care providers often try to assess their patient’s health literacy level by asking their patients the last year of school
completed. Samora, Saunders, and Larson (1961) report that patients with higher educational backgrounds also struggle with medical terminology. They found that one third of the participants who reported completing seven to nine years or ten to eleven years of schooling as well as one fourth of the participants who reported graduating from high school were unable to adequately define the medical terms presented suggesting a poor correlation between adequate health literacy and reported last year of completed education. When patients seek care, the HCP must take the appropriate steps to ensure that patients are informed and active participants in the plan of care. One of the first steps is to be sure that the patients’ receive the information in a manner that they understand. Further research needs to be done to assure that appropriate cues are used by HCPs to assess and recognize LHL.

The results of this secondary analysis may have implications for all HCPs who practice in the CHCs by identifying decision support services used for patients with LHL. Additionally, this study may help provide awareness of the need for LHL training for those who serve vulnerable populations in urban and rural geographical settings and for the proportion of CHC patients whose primary language is not English.

Further research is needed to better determine the best ways to communicate with persons with LHL, especially those with limited understanding of English. Best practices regarding communication are needed to provide physicians, nurse practitioners, and physician assistants with the tools needed to promote productive interactions with informed, activated CHC patients.

In addition, this secondary analysis provided information regarding the LHL programs, assessment, and interventions that are most often used in the CHC setting. This information may assist nurses in identifying and developing evidence-based interventions for patients in CHC
settings. Providing interventions to improve the HCP interaction with the patient may help promote the health of these patients and may result in better health outcomes.

Health literacy poses a challenge to a significant portion of the patients cared for at CHCs (Sullivan et al., 2011). Specific interventions need to be designed to assist HCPs in the community health setting. Before interventions can be developed, a better understanding is needed about the relationships between CHC contextual characteristics (e.g. geographical location, size, health care provider type, and primary language of the patient), the decision supports provided (health literacy assessment, formal training, and health literacy programs), and LHL interventions used by the HCPs.
Chapter 2

Review of Literature

In order to provide a foundation for the exploration of the low health literacy (LHL) resources used at community health centers (CHCs), this chapter is divided into several sections. The beginning section of this chapter includes a description of the conceptual framework that guided this study and the study’s use for health literacy. The second section looked at the application of the Health Care Organization regarding CHC geographical location, size, provider mix, and the percentage of patients in their individual patient panels who are non-English speaking. The third section addressed the assessment of health literacy and formal training programs specific to healthcare providers (HCPs) within the context of decision support. The fourth section, Productive Interaction, reviewed LHL interventions that were used by health care providers to enhance communication with patients with LHL. The final section discussed the gaps in the literature.

2.1 Introduction

Over the past decade there has been an increasing focus on LHL and its effects on the American people. In 2003, the National Assessment of Adult Literacy (NAAL) provided the most recent detailed description of adult literacy in the United States (US). The report found that 100 million Americans (36%) were at or below basic health literacy (Kutner et al., 2006). Since then, studies have focused on identifying the problems associated with LHL. Problems related to LHL include access to health care, understanding and complying with treatment plans, communication with HCPs, and poor health outcomes. Compounding this problem, the 1993 National Literacy Survey (NALS) indicated that 75% of those with a chronic disease also had marginal literacy skills. These statistics provide the impetus to identify those with LHL and
further emphasizes the importance of health literacy interventions (Kirsch, Educational Testing Service, & et al., 1993). Koh and colleagues (2013) proposed that health literacy must be integrated into the way health care is provided in all practice settings. They stressed that including patients in health care decision making essentially depends on health literacy. The HCP and the patient need to communicate in a way that provides basic health information and services in a collaborative approach. Health literacy is a critical factor in the success of the HCP to offer quality care (Schillinger, Bindman, Wang, Stewart, & Piette, 2004). It is imperative that CHCs provide the HCPs with decision support regarding LHL resources to assist in facilitating quality care to their patients.

2.2 Conceptual Framework

Koh and colleagues (2013) are encouraging the adoption of the Health Literate Care Model (HLCM) into practice. This model is an adaptation of Edward Wagner’s Chronic Care Model. Over time, the Chronic Care Model has been adjusted for use in most care settings beyond the care of patients with a chronic disease. The name has been changed to the Care Model to reflect its use in many different health care settings and patients not just with those with chronic disease (Barr et al., 2003). The HLCM is based on the need for HCPs to be aware that at some point all patients are at risk for not understanding health information relevant to their health. In essence all patients should be considered to have LHL. Since the Care Model has been extensively used in CHC research this model was used as the conceptual framework.

A review of the Care Model assisted in understanding how the model was adapted to incorporate health literacy principles. The Care Model was developed to identify and organize change in the health care organization, the medical practice, and in collaboration with the patient to improve functional and clinical outcomes (Glasgow, Orleans, & Wagner, 2001). The Care
Model recognized that quality is based on the productive interaction between a prepared, productive practice team and an informed, activated patient (Schaefer & Davis, 2004). This informed, activated patient is able to communicate effectively with the HCP regarding their disease condition and prescribed plan of care. The HCP uses evidence-based clinical information to assist the informed, activated patient in improving the patient experience as well as clinical outcomes (Glasgow et al., 2001; Oprea, Braunack-Mayer, Rogers, & Stocks, 2010). The Care Model is intended to be flexible and adaptable to new evidence when it emerges, such as health literacy principles (Holm & Severinsson, 2012). The intention of the Care Model is to change the health system from an acute and reactive point of care to a proactive, planned, and population based care system (Coleman, Austin, Brach, & Wagner, 2009).

There are six elements that make up the Care Model as shown in Figure 1. The two overarching elements are the health system and the community. The health system is considered the health care organization and the community provides the specific resources and policies that support the health system. The remaining four elements focus on the clinical practice of the health system organization including: self-management support; delivery system design; decision support; and clinical information systems (Wagner et al., 2001). These four clinical practice elements are necessary for productive interactions to occur between the patient and the practice team that subsequently lead to improved health outcomes. Proactive interactions can only occur when the practice team is prepared and proactive, and the patient is informed and activated.
An increasing number of health system organizations have adopted the Care Model to provide primary care and increase patient involvement (Gugiu et al., 2013). The Care Model has influenced the quality of the care of many American and International health care systems. Wagner (2010) asserted that the Care Model should be an integral part of the patient center home in any health system organization.

**Health system: Health care organization.**

The health system is viewed as part of the community because it needs to be linked to the resources that are available in the broader community (Wagner et al., 1999). The health system must be committed to the implementation of the Care Model to improve outcomes (Dancer & Courtney, 2010). This commitment must be communicated by the health system leadership. The health system leadership is responsible for providing the resources to assist with practice changes.
needed to assure quality. The resources are also needed to develop the informed, activated patient and the prepared, proactive practice team (Wagner et al., 1999). The practice team needs the necessary expertise from the community as well as information, time, and resources to assure quality. The health system must also provide the patient with information and confidence to assure the patient is informed and is an active participant in their care. This support of resources and information leads to productive interactions between the patient and the practice team allowing the delivery of quality care and positive outcomes (Austin, Wagner, Hindmarsh, & Davis, 2000). Koh et al. (2013) described the responsibility of the health care organization’s leadership to bring together a health literacy team that is charged with implementing health literacy strategies, identifying patient populations, and monitoring outcomes. Once the team is established they will need to assess the practice regarding current use of health literacy interventions and educate the CHC staff including the practice team, regarding health literacy strategies and interventions. The CHC was considered the health system organization for this study.

**Clinical practice elements.**

The clinical practice section of the Care Model represents the elements of the health system that need to be enhanced to promote a productive interaction between the patient and the practice team. The first element, self-management support, requires a collaborative approach that assists patients and families to manage their health and health care (McCulloch, Davis, Austin, & Wagner, 2004). This approach is accomplished through the interactive communication that defines health problems, sets priorities, establishes patient centered goals, creates an individualized treatment plan, solves problems along the way, and follows-up on the care provided (McCulloch et al., 2004; Wagner et al., 1999). Koh et al. (2013) provided examples of
health literacy strategies that can assist in improving the patient’s self-management. The examples focus on communication between the patient and the practice team through the use of the “teach back” method and the development of an individualized action plan that is realistic and achievable by the patient.

The second element, delivery system design, focuses on how health care services are organized, delivered, and staffed (Wagner et al., 1999). This element looks for innovations that expand care and improve the quality of care and health outcomes (Dancer & Courtney, 2010). Delivery system design provides help to the health care system in defining the roles of the practice team and planned interventions indicated by evidenced-based practice. Delivery system design assures that there is routine and follow-up care which is culturally appropriate and proactive in nature (McCulloch et al., 2004). Koh et al. (2013) suggested that the CHC would need to have interpreter services available to address patient language barriers. For the practice team, Koh et al. (2013) suggested the development of strategies to improve medication adherence and decrease medication errors. One strategy suggested was instructing patients to bring in all medications and supplements with each visit for the practice team to review.

Clinical information systems are the third element in the Care Model that works in conjunction with delivery system design to provide an accessible patient database (Wagner et al., 2001). This database organizes the data to effectively provide care through timely reminders, coordination of care, individual patient information, and exchange of information between the patient and the practice team. The clinical information system also provides relevant data regarding care and feedback on the organization’s and practice team’s performance (McEvoy & Barnes, 2007). Koh et al. (2013) felt that automatic practice reminders need to be developed around health literacy. The automatic practice reminders need to include the review of
medications, the use of the “teach back” method, and the follow-up related to self-management goals and referrals. Koh et al. (2013) also suggested that the clinical information systems should be used to assist the patients with health education, care coordination, and needed referrals.

The last element is decision support. Decision support assures that the practice team has the resources and access to the information needed to provide quality care to their patients (Wagner et al., 1999). This information is based on evidence-based guidelines, providing the practice team with the most effective treatment modalities for the patient population being served. The guidelines assist in producing protocols, standing orders, and care reminders for the practice team (Dancer & Courtney, 2010). Care reminders can be accomplished by the electronic medical record, a chart flow sheet, or as part of a patient review process (Wagner et al., 2005). The decision support aids in the decision making process between the practice team and the patient. In addition to the use of evidence-based guidelines, the practice team benefits from formal training and programs presented by experts (Wagner, 2010). The health system leadership is charged with assuring that the evidence-based guidelines are rooted in daily practice and communicated to the patients to enhance care (Dancer & Courtney, 2010). The intention of the decision support element is to help change the practice team’s behavior to improve patient outcomes and satisfaction (Pasricha et al., 2013). When addressing health literacy in decision support, Koh et al. (2013) stressed the need for educational material be created in an easy-to-read design. Consideration needs to be given to the use of alternative methods of educating the patients, such as the use of pictures and videos. The practice team needs to be educated to encourage patient questions and the effective use of health education materials based on the patients’ culture and understanding. Specifically, decision support as it pertains to the Care Model guided this study and thus, the review of the literature (Figure 2.2 Decision Support).
2.3 Overview of the Use of the Care Model in Research

Health care organizations throughout the world have adopted the Care Model for the delivery of care. In addition, several researchers have used this model to guide their research. This section provided a brief overview specific to decision support within the context of the Care Model.

Many interventional studies have been conducted examining the implementation of one to all of the elements of the Care Model. The studies were designed to look at the effectiveness
of the elements in improving clinical outcomes (Chin et al., 2004; Chin et al., 2007; Finkelstein et al., 2005; Haggstrom, Taplin, Monahan, & Clauser, 2012; Mackey et al., 2012; Pasricha et al., 2013; Pearson et al., 2005; Si et al., 2008). Many of these studies were conducted to evaluate the success of the Health Disparities Collaborative (HDC) at CHCs throughout the nation that was sponsored by the Health Resources and Services Administration (HRSA). The Care Model served as a guide for CHCs to improve the quality of care regarding chronic disease (Coleman et al., 2009). The results of the HDC research indicate that the CHCs varied greatly in their strategies to implement all six elements of the Care Model. All of the CHCs implemented changes in decision support through the recommended use of evidence-based guidelines. Many CHCs focused on improving their information system by implementing a data base for patients with a specific disease process such as diabetes or asthma. The least amount of change was made in the element of community resources and policies. In each of the HDC research studies, no significant improvement in clinical outcomes was found after one year of implementation of the CM (Chin et al., 2004; Pearson et al., 2005). Chin et al. (2004) questioned whether one year was a long enough period of time to detect improvement in clinical outcomes. To address this question Chin and colleagues (2007) examined the effect of the HDC had on care and clinical outcomes over a four year period of time. The results of the chart audit showed there was a decrease over time in the average Hgb A1c (-0.45%, CI 95%, -.72 to -0.17) as well as low density lipoprotein cholesterol (-19.7 mg/dl, CI 95%, -25.8 to -13.6). The researchers felt that further decision support strategies are needed regarding diabetic education and self-management goals. Research is needed to determine what resources are desirable for the practice team and for the patient to enhance decision support and productive interactions that can lead to improved health outcomes. A more recent study conducted by Haggstrom and colleagues (2012) looked
closely at a matched set of CHCs that participated or did not participated in the HDCs. The results noted that both types of CHCs had measurable Care Model implementation. Those CHCs that participated in the HDC were statically more likely to have implemented all of the elements of the Care Model \((p = 0.002)\). There were significant differences found in the four practice elements of the Care Model by the HDC participants. The Care Model elements of the health care organization and community resources and policies showed no difference in significance between the two CHCs groups. Further research is needed with long-term follow-up to determine if clinical process changes can be detected over a more extended period of time (Haggstrom et al., 2012).

The majority of the current research has been conducted in the U.S. For the most part, the majority of the studies presented here were conducted using the Care Model as the framework and relied on information from HCPs and CHCs rather than externally collected data (Coleman et al., 2009). The Care Model is a framework which guides the healthcare organization in making changes in the delivery of care. Research shows that practice changes vary, depending on the strength, dedication, resources, and support of the health care organization. More research is needed regarding the implementation and sustainability of each of the six elements of the Care Model including decision support.

2.4 Health Care Organization

The role of the CHC within the Care Model is to provide the resources and support necessary for the patient and the practice team to engage in productive interactions and promote improved outcomes (Wagner et al., 1999). Community health centers serve primarily a high-risk, medically underserved population. Community health centers serve nearly 22 million people, more than half of the people served are racial/ethnic minorities (40% are Hispanic/Latino), and
two thirds live at or below the federal poverty level (Centers, 2014). Currently, over one third (36%) of the current CHCs serve patients in rural geographical areas. Community health center organizations may be a network of clinics throughout a community or may operate as a single site. At present there are 1,198 CHC organizations with 8,912 delivery sites (Centers, 2014). In regard to the CHC characteristics of the 49 CHCs that participated in the original study, Schlichting et al. (2007) reported that more than half of the CHCs were located in urban settings (55%). The HCPs reported that 25±30% of the patients treated at their respective CHCs were non-English speaking. The perceived level of LHL by the HCPs of their English speaking patients was 41±24% and among Spanish speaking patients the perceived LHL was 48±30%.

The majority of the HCPs who responded to the survey were physicians (46%) followed by nurse practitioners (20%), dentists and dental hygienists (15%) and physicians’ assistants (11%). The majority of the HCPs were female (58%) and white (74%).

Koh et al. (2013) provided information on how the health care organization could institute the HLCM. Koh and colleagues (2013) suggested the establishment of performance goals for the practice team that address health literacy. These goals need to focus on the assessment of the health literacy needs of the patient. The health care organization needs to provide organizational-wide training focusing on communication, health literacy skills and interventions. The characteristics of the CHC: size, geographical location, reported primary language of the patient, and health care provider were reviewed regarding health literacy and the Care Model. No research could be found that examined the differences in the size of CHCs and health literacy interventions.
2.5 Geographical Location

Urban health literacy studies.

Extensive research on health literacy has been conducted in urban areas. Many patients from both public and Veteran’s Administrative hospitals and clinics have been used to study health literacy (Al-Tayyib, Rogers, Gribble, Villarroel, & Turner, 2002; Artinian et al., 2002; Barragán et al., 2005; Chew, Bradley, & Boyko, 2004; Coughlin et al., 2006; DeWalt et al., 2006; Dolan et al., 2004; Funnell et al., 2008; Kalichman & Rompa, 2000; Osborn, Persell, & Wolf, 2007; Paasche-Orlow et al., 2005; Rothman et al., 2005; Sanders, Thompson, & Wilkinson, 2007; Shea et al., 2004; Wilson, Baker, Nordstrom, & Legwand, 2008). A large number of the urban-based research studies were descriptive in nature to ascertain characteristics of persons with LHL. In synthesizing the results of these studies it is clear that individuals with LHL come from all walks of life. In addition, older age, limited education, limited English proficiency, minority race (including African American, Latino, and Native American/Alaskan Eskimo), and low socioeconomic status are factors that are related to LHL (Baker et al., 1997; Baker et al., 2007; Davis, Michielutte, Askov, Williams, & Weiss, 1998; Gazmararian et al., 1999; Kim et al., 2001; Kirsch et al., 1993; Shea et al., 2004).

For the most part, almost all health literacy interventional studies were conducted in an urban setting. The majority of the studies focused on interventions that improved clinical outcomes. The results, for the most part, found that if individualized or group activities were provided in a simple, easy-to-read, and understand manner, health related outcomes improved somewhat but not always at a statically significant level (Artinian et al., 2002; Cavanaugh et al., 2009; Chew, Bradley, Flum, Cornia, & Koepsell, 2004; Drainoni et al., 2008; Kalichman, Cherry, & Cain, 2005; Mancuso & Rincon, 2006; Paasche-Orlow et al., 2006; Rudd et al., 2009;
Wilson et al., 2008). Many of the studies cited the reason for improved outcomes, but not statistically significant improvements, included the completion of the study in a year’s time or less, small sample size, and a high participation refusal rate. There were studies that found no association between health literacy and improvement in self-management behaviors (Endres, Sharp, Haney, & Dooley, 2004; Kim, Love, Quistberg, & Shea, 2004; Morris, MacLean, & Littenberg, 2006; Sarkar, Fisher, & Schillinger, 2006). The extensive use of the urban geographical region in health literacy research provides for a greater opportunity for HCPs to be exposed to health literacy information and education.

**Rural health literacy studies.**

To date, only a few research studies have examined health literacy in patients in rural settings (Harper, Thompson-Robinson, & Lewis, 2003; Hayes, 1998, 2000; Wood, 2005). Convenience samples were used to examine different aspects of the relationship between LHL and the rural patient. All of the studies assessed the patients’ health literacy level using either the Rapid Assessment of Adult Literacy in Medicine (REALM) or the Test for Functional Health Literacy in Adults (TOFHLA). Each study assumed that there would be a high level of LHL among this population. Harper et al. (2003) found that 97% of patients enrolled (29 of 30) had adequate health literacy compared to 51% of the patients who were found to have adequate health literacy and 11% LHL in a study conducted by Wood (2005); the REALM was used in each of these studies to measure health literacy. The participants were further tested regarding their ability to read a set of patient education instructions. Forty nine percent of these participants were unable to read most patient education material (Wood, 2005). Wood (2005) stresses the need to adjust the written and verbal communication to the individual patient’s ability, even for those tested as having “adequate” health literacy.
In studies conducted by Hayes (1998; 2000), a high level of LHL was found. About 78% of the patients surveyed in an Emergency Room in rural Kansas were found to have LHL as measured by the REALM. These two studies found that health literacy was not a predictor of understanding patient educational material. The participants were randomized to receive either standardized discharge instructions or individualized discharge information specific to their medical needs. The use of individualized education sheets helped the patient and the caregiver to understand and retain the needed health information regardless of health literacy level. These findings point out that LHL is not consistent across studies conducted in rural settings. The results emphasized the need for rural HCPs to understand that it is not realistic to hand patients educational pamphlets and expect them to understand the material. Wood (2005) stressed that teaching not only needs to be provided, but also understood by the patient. Because of the limited use of rural geographical regions in health literacy research it is less likely those HCPs in a rural setting have been exposed to health literacy practices and education.

2.6 Health Care Provider

Individuals with LHL are limited in their ability to access and navigate the health care system, as well as make informed decisions (Davis, Williams, Marin, Parker, & Glass, 2002). Health care providers need to use appropriate LHL cues such as, less than eighth grade education, advanced stage of cancer at diagnosis, and decreased compliance with treatment regimen. Health care providers also need to be able to modify the interventions used for providing health information to those with less than adequate health literacy (Davis et al. 2002).

There are a few research studies that have used provider-directed interventions related to LHL. Two randomized control studies compared patients receiving usual care to patients whose HCPs had received prior knowledge of their patients’ health literacy status and had learned LHL
strategies to assist the HCP in providing patient care (Ferreira et al., 2005; Seligman et al., 2005). Results of both studies showed that HCPs overestimated their patients’ health literacy status and the HCPs felt that they were less effective during their office visit. However, patients in the intervention groups showed significant improvements in health outcomes measured compared to the control groups.

Cohen et al. (2011) examined the patient-provider interaction through a post-care interview. Only 10% of patients interviewed verbalized difficulty understanding the instructions provided by the physician or the dentist. These results were unexpected and raised the question as to whether the patients might have thought they understood the instructions when in fact they did not.

There is a need to understand the factors that affect HCP/patient communication as well as the relationships between provider-patient interaction, communication, health literacy resources, and support. In addition, longitudinal studies are needed to better understand the effects of health literacy on health outcomes over time.

2.7 Health Literacy in English- versus Spanish-speaking Populations

With development of the Spanish version TOFHLA, the testing of health literacy in the Latino population has increased over the past few years (Williams et al., 1995). It is important to look at this population because its continued growth has made the US. the third largest Spanish-speaking country in the world (Schmidt, 2000). Recent studies comparing Spanish-speaking patients to English-speaking patients found that patients who were Spanish-speaking experienced poorer understanding of health care terms and had limited access to care (Baker, Gazmararian, Sudano, & Patterson, 2000; Brice et al., 2008; Fang, Machtinger, Wang, & Schillinger, 2006; Mutchler, Bacigalupe, Coppin, & Gottlieb, 2007; Xu, 2003). Latinos in the US have consistently
been found to have lower health literacy levels that any other ethnic group (Baker et al., 2000). One of the major barriers to accessing and understanding health care information is language (Britigan, Murnan, & Rojas-Guyler, 2009; Leyva, Sharif, & Ozuah, 2005). The Spanish-speaking participants found it difficult to obtain an appointment, understand discharge instructions, or find an interpreter who was available to translate for them. Lack of understanding resulted in poor health outcomes and adherence issues (Britigan et al., 2009). Even those who stated they were comfortable speaking English had difficulty describing patient instructions that were written in English (Leyva et al., 2005). One prospective, matched cohort design compared the level of health literacy in 86 matched pairs of English and Spanish speaking adults. Health literacy function was determined using the TOFHLA in the participants’ primary language. Results showed that 74% of the Spanish-speaking participants were found to have LHL compared to 7% of the English-speaking participants (Brice et al., 2008).

Research involving the Latino population needs to assure accurate representation of diverse Latino populations with different dialects. In addition, educational interventions for this population need to be developed and tested. There is a trend that notes Latino patients are less knowledgeable about health-related issues. The HCPs need to be aware of their patients’ cultural beliefs specific to health and illness (Talavera, Elder, & Velasquez, 1997). A better understanding of the relationship between health literacy and patient-provider communication is needed. In addition, interventions need to be developed to eliminate language barriers.

2.8 Decision Support

Within the Care Model, the decision support element is where health literacy guidelines, resources, and access to information are provided to assure productive interactions between the practice team and the patient. In the original study, Schlichting et al. (2007) asked in the survey
questions that were related to decision support regarding the assessment of health literacy, formal training specific to dealing with patients with LHL, and the types of LHL programs that were offered at their CHCs. The results showed that the majority of the providers (96%) asked their patients if they had any questions or understood the instructions. Very few HCPs (4%) assessed their patients’ health literacy using a valid health literacy questionnaire. Only 22% of the HCPs reported having received formal HL training. For those HCPs who had received formal HL training, they were more likely to ask their patients about their last grade in school completed. Formal health literacy programs that were reported by the HCPs consisted of encouraging the patient to bring a friend or family member to the office visit (68%), and referring patients to a social worker or other clinical staff (62%). Only six percent of the HCPs reported having a dedicated LHL specialist at their CHCs. When asked which LHL programs would be of greatest benefit, the HCPs felt having health education materials designed for patients with LHL (88%) would be most helpful. Koh et al. (2013) suggests that CHCs promote the use of decision making aids that are self-paced and encourage patient interaction. The practice team needs to employ shared decision-making interactions to promote productive interactions and improve clinical outcomes. For this review, the following decision support elements were addressed including the assessment of health literacy, the formal health literacy training, and the health literacy programs.

2.9 Health Literacy Assessment Tools

There is not a universally accepted tool to measure health literacy in a clinical setting (Johnson & Weiss, 2008). Health care providers have used several different measures to assess health literacy; one of the most often used is to ask for the patient’s education level. Wilson and
McLemore (1997) found that the patient’s health literacy level is two grade levels less than the stated education level.

Many methods to measure health literacy have evolved over time. The methods most often found in the literature include the Rapid Estimate of Adult Literacy in Medicine (REALM), the Test for Functional Health Literacy in Adults (TOFHLA), and the Newest Vital Sign (NVS). These tools have been used in research studies and rarely used for clinical purposes.

For research purposes, the TOFHLA has the stronger predictive validity related to health outcomes in many areas with the exception of medication adherence (Osborn et al., 2007). For this reason, the TOFHLA should be the tool used to measure health literacy for research purposes. It is not generally realistic for the HCPs to perform health literacy testing in their practice. There are several factors involved with this conclusion, including the amount of time it takes to complete the health literacy assessment, given that the average clinical visit lasts 18 minutes (Grey, 2008). Consideration needs to be given not only to the health literacy assessment of patients, but also the HCPs awareness of the varying levels of health literacy among the patients.

2.10 Formal Health Literacy Training Programs

Health care providers need to have an awareness of the process of giving information to patients and the patients’ ability to recall and understand the information (Doak et al., 1996). The HCP needs to be able to recognize with each patient encounter the challenges faced by the patient regarding health literacy, culture, and beliefs, just as well as they recognize the diagnosis and management of the disease processes (Lie, Carter-Pokras, Braun, & Coleman, 2012). By addressing LHL and cultural disparities, about 40% of the patient visits that may be compromised by poor adherence and medical errors could be avoided (Zaarcadoolas, Pleasant, &
Health care provider training regarding LHL assessment and cultural disparities can assist with improving health outcomes (Schwartzberg et al., 2007). Training needs to focus on communication strategies that are effective, clear, and evidence-based.

It is imperative for HCPs to become experts at assessing health literacy and implementing interventions to assist the patient with LHL. The cost of LHL in the U.S. is eight to fifteen billion dollars a year in excess hospital costs. Total direct costs are estimated between $30 billion and $473 billion, while indirect costs are estimated at $100 billion (Allen, 2000). Improving health literacy for all is essential to reducing health care costs in the U.S.

Wide ranges of educational interventions have been designed to improve health outcomes of patients with LHL. To assist HCPs in understanding how to implement interventions to patients with LHL, the American Medical Association (AMA) produced a Health Literacy Introductory Kit (American Medical Association, 1999). This kit provides HCPs with ways to assess health literacy, improve communication, and care for patients with LHL (Parker & Schwartzberg, 2001). Among the suggestions in the kit, is using the teach-back technique to assure patients understand instructions (American Medical Association, 1999). For written materials, the kit recommends simple graphics as well as avoiding the use of graphs and keeping material below the fifth- to sixth-grade reading level. The kit recommended linking medication times to daily events and making the medication schedule as simple and predictable as possible to ensure safe medication administration (Prasauskas & Spoo, 2006).

To date there are very few studies that evaluated the training of health care professionals’ assessment and communication with patients with LHL (Harper, Cook, & Makoul, 2007; Hess & Whelan, 2009; Mackert, Ball, & Lopez, 2011). Two of the studies focused on the training of medical students (Harper et al., 2007; Hess & Whelan, 2009) and a third focused on training
health care workers of all kinds (Mackert et al., 2011). Each of the studies used a similar curriculum for the health literacy training. The training included a definition of health literacy, the impact of health literacy in patient care, and strategies for communicating more effectively. The results were similar for each of the studies and training sessions provided an increase in awareness of the need for clear, effective communication. On post-training surveys there was an increase in the medical students’ and the health care workers’ intention to use plain non-medical language and the teach-back method. Neither of the studies assessed the adoption of the behaviors over time. Further research is needed to determine not only how the HCP becomes more aware of their patients’ health literacy status, but also how to respond to their patients. In addition, research is needed regarding the role the health care organization plays in providing the health literacy infrastructure needed to have an informed, activated patient.

2.11 Productive Interactions

Productive interactions are the result of effective communication between the prepared, proactive practice team and the informed, activated patient (Schaefer & Davis, 2004). The ability of the informed activated patient to communicate with their HCP regarding their medical condition and treatment plan improves the patient experience as well as clinical outcomes (Glasgow et al., 2001). In the original study, Schlichting et al. (2007) asked on the survey what special methods or techniques the HCP used to assist their patients with LHL. The results found that almost all of the HCPs reported using at least one special method or technique. The techniques most often selected by the HCPs included: Use of laymen’s terms (95%); reviewing instructions carefully (95%); providing health education materials (86%); bringing friends or family members to the office visit (68%); and, having patients repeat back instructions (66%). Only 35% of the HCPs gave their patients with LHL health education material specially designed
for patients with LHL. Those HCPs that received formal health literacy training were more likely to ask their patients to repeat back the information and use health educational material specially designed for patients with LHL. Koh et al. (2013) encouraged the use of the 2010 Agency for Healthcare Research and Quality “Health Literacy Universal Precautions Toolkit” for specific health literacy interventions. They also stressed the use of easy-to-read written health education materials, the use of the teach-back method to assure patient understanding, and an increase in communication between the practice team and the patient that allows for shared decision-making. Productive interactions as they pertain to LHL interventions are addressed in the following section.

2.12 Low Health Literacy Interventions

Most of the intervention strategies that have been formally researched focus on making health education materials easier to understand so that patients can be better prepared to self-manage their disease or condition. The studied interventions occurred in different healthcare settings using many different types of HCPs. The depth of the educational interventions ranged from a one-time session to assist in understanding self-care (DeWalt et al., 2006; Wilson & McLemore, 1997) to an intensive program with one-on-one educational sessions that took place over a one year period (Rothman et al., 2005). For the most part, the health literacy interventions that have been researched can be categorized into one of four areas: personal contact, multi-prong, computer, and written materials (Schaefer, 2008). Low health literacy interventions regarding personal contact and written materials are the primary focus of the next section because responses to question seven of the Health Literacy Survey that was administered in the original study was further analyzed in this study.
**Personal contact interventions.**

Personal contact intervention studies have included a variety of HCPs including physicians, nurse practitioners, registered nurses, physician assistants, health educators, or pharmacists. Interestingly, only those studies that involved physicians and nurse practitioners and personal contact interventions showed significant benefit to patients with LHL.

DeWalt et al. (2006) compared the use of a general congestive heart failure education pamphlet with a one-on-one educational session that emphasized self-care strategies. Without regard to the level of health literacy, all the patients in the education group benefited from the one-on-one educational session as measured by a lower rate of hospitalization and fewer deaths measured over a 12-month period of time. The use of intense year-long educational sessions versus usual care was compared in a study done by Rothman et al. (2005). Greater improvement in self-care was found in those participating in the educational sessions, regardless of the patient’s health literacy level.

A face-to-face study used registered nurses to deliver three different educational sessions (Kalichman et al., 2005). These sessions were designed using pictographs and minimal words to assist in promoting understanding and adherence. The results demonstrated that although there was an increase in knowledge, the impact of the three different educational sessions was not statistically significant (Kalichman et al., 2005). A nurse based program to improve medication adherence in persons with HIV/AIDS through tailored information to promote behavior changes was developed (Holzemer et al., 2006). The results showed no statistically significant differences between usual care and the medication adherence program. The lack of significance may be attributed to small sample size, short duration of the intervention, and the reliance on subjective outcome measures (self-reporting of adherence) (Holzemer et al., 2006; Kalichman et al., 2005).
Written material interventions.

The use of written materials is an integral part of patient teaching. The HCP is the key person in providing this education to the patient. It is well documented that most patient education material, contracts, and informed consents are written at a reading level which is too high for most patients (Boswell, Cannon, Aung, & Eldridge, 2004; Cooley et al., 1995; Hill-Briggs & Smith, 2008; Raymond, Dalebout, & Camp, 2002; Roskos, Keenum, Newman, & Wallace, 2007; Rutherford et al., 2006; Wilson, Racine, Tekieli, & Williams, 2003). Most interventions related to written material modified existing documents or educational information by simplifying and putting them into plain language (Davis, Holcombe, Berkel, Pramanik, & Divers, 1998; Hayes, 2000; Jacobson et al., 1999; Morrow, Weiner, Steinley, Young, & Murray, 2007). Other modifications to written material interventions were the inclusion of pictures (DeWalt et al., 2006; Dowse & Ehlers, 2005; Kripalani et al., 2007; Powell, Tanz, Uyeda, Gaffney, & Sheehan, 2000). Davis and his colleagues (1998) modified the consent form used for a Phase III breast cancer trial from a sixteenth-grade reading level to a seventh-grade reading level using the Fog Readability Index as a guide. While the study participants preferred the consent written at a seventh grade level, the overall comprehension of the consent form remained very low.

Pictorial interventions have been developed to determine if the use of pictures enhances the learning and comprehension with written patient educational material. There are several intervention studies incorporating the use of pictures in medication education sheets (Dowse & Ehlers, 2005; Kripalani et al., 2007; Morrow, Hier, Menard, & Leirer, 1998). Morrow et al. (1998) examined the use of timeline icons or text only instructions in relationship to comprehension of education information. The study found participants, regardless of their age,
were able to answer questions related to dose and time quicker and with more accuracy when the education sheet that included icons was used ($p < 0.05$). The integration of the icons into the text appears to improve comprehension and understanding of medication regimens. Dowse and Ehlers (2005) conducted an intervention study that looked at the use of text-only medication labels or text and pictogram medication labels. The results found that on average 95% of those who received the text and pictogram label were able to understand and follow the prescribed directions compared to 70% of those who received the text-only directions ($p < 0.01$). Ninety percent of those who received the pictogram medication label were able to adhere to and complete the antibiotic course versus 72% of those who had the text-only label ($p < 0.01$). In a study done by Kripalani et al. (2007), the concept of a pictogram medication label was taken a step further with the development of a pill card that illustrated the patient’s daily medications using pill images and icons. The study compared groups who received usual care to those who also were given an illustrated pill card or refill reminder post-card, or were randomized to receive both the pill card and the refill reminder cards. The results noted that all patients, regardless of health literacy, felt the illustrated pill card was a useful reminder. Those with marginal and inadequate health literacy used the pill card most frequently ($p < 0.05$) and derived the greater benefit from the pill card compared to those with adequate health literacy.

Wilson et al. (2008) assessed the effectiveness of using the “teach-back” procedure recommended by the AMA to assess and promote understanding. Mothers who brought their children in to be immunized were given the Centers for Disease Control and Prevention (CDC) Vaccination Information Statements (VIS) to inform the mothers about the benefits, risks, and safety issues regarding the vaccine. The mothers were then asked to repeat in their own words their understanding of the information on the VIS sheets. Those with LHL provided more partial
and incorrect responses ($p = 0.02$). There were inconsistencies in the mothers’ responses to the important information regarding the immunizations.

There was consensus among the studies that the written materials need to be written at a lower reading level and in simple English. Further research needs to be conducted to determine the optimal readability level and layout of the educational information. To be effective in educating patients, Jacobson et al. (1999) encourages the use of a fifth-grade reading level and educational materials that are simple, easy to use, not too complex, and do not use advanced technology. More research is needed to study how the grade level of educational materials provided to patients influences their ability to communicate with the HCP.

### 2.13 Gaps in the Literature

Understanding LHL begins with examining the characteristics of the person with LHL. Thus far, these characteristics include the poor, elderly, minorities, males, and non-English speaking people (Nokes et al., 2007). The majority of the studies were conducted in an urban setting, in inner-city hospitals and clinics. Very few research studies have been conducted in the community health center or the rural setting, and the findings from these studies were inconsistent. Further research with a larger sample size in different health care practice settings, such as community health centers, is needed before results can be generalized. To date, there are no research studies that compare the use of health literacy decision support and interventions at urban and rural CHCs.

Low health literacy is prevalent in the Latino population regardless of whether they speak English or are non-English speaking. Brice et al. (2008) stressed the need to examine the relationships between and among primary language, reading level, and educational level. Leyva et al. (2005) showed that health literacy levels cannot be determined with any degree of
confidence if assessed in English when English is not the primary language of the patient. Other gaps in this area include the need for recognition of different Spanish dialects, which often vary by geographic region. Additionally, information is needed to determine which LHL educational interventions need to be tested for effectiveness in Spanish-speaking patients.

There is a great need for research regarding the curricula to be used to improve knowledge, skills, and attitudes concerning health literacy (Lie et al., 2012). Best practices need to be developed as well as best training methods for CHCs to assure a change in behavior.

Research demonstrated that LHL poses significant challenges to improving patient care, especially in urban settings. Community health centers that have established interventions in all six elements of the Care Model achieve better outcomes (Wagner, 2010). Less is known about the impact of the health care organization regarding decision support for LHL guidelines and resources needed at CHCs. In addition, the impact of LHL in rural health care settings compared to urban health care settings and among Latino patients is not clear.

Response bias when using a self-administered survey may be a concern. The concern is based on the HCPs’ perception of health literacy practices in answering the survey questions. The results may be inflated by the HCP who answered the questions as they perceived rather than as they actually existed at the CHC (Bowling, 2005). The assumption being made in this secondary analysis is that the responses to the survey were honest and accurate. Waltz, Strickland and Lenz (2010) supports this assumption, stating that the self-administered survey allows the survey participants to express their honest opinion due to anonymity, as well as the participants’ ability to determine time, pace, and setting for the completion of the survey.
2.14 Conclusion

Patients with LHL often have a variety of complex issues that can lead to a multitude of problems within the health care system. Difficulty in communication, lack of understanding and managing health issues, and following through with directives and recommendations are common. Further research is needed to determine what the best practice is for communicating with patients with LHL, and how communication can most effectively be adapted to assist the broadest range of patients. Identifying best practices that are evidence-based will guide development of curricular changes and continuing education programs that provide training information in health literacy for HCPs.

Health care providers play an important role in the implementation of interventions that are designed to improve the health literacy of patients. The Joint Commission’s White Paper (The Joint Commission, 2007) on health literacy strongly advocates for all HCPs to identify learning and educational needs, use correct educational materials, assess the patient’s ability to understand, and use and apply information given during each patient visit. By using these suggested interventions to benefit the patient, HCPs may be able to deliver care that addresses the individual patient’s needs in a way that will lead to increased patient satisfaction and improved health outcomes. Underlying all of the information presented is the need to understand communication barriers between the HCP and their patients.

Most research has focused on the characteristics of the patient with LHL. The research has shown the patients with LHL are less likely to understand, retain, and integrate health information. Patients with LHL will have a higher rate of medical complications (Schillinger et al., 2002). Research is lacking regarding health literacy skills needed by the HCP and the demands LHL places on the health care system.
As integral members of the health care team, nurses need to be involved in the development of evidence-based interventions to meet the health literacy needs of their patients in the least threatening manner. The role health literacy plays in the communication process, what aspects regarding health literacy are needed in order to improve outcomes, and what interventions are most effective in improving care are questions that need to be answered. The gap this secondary analysis may fill is a better understanding of decision support regarding LHL interventions, formal training, and programs used by CHCs depending on the size, geographical location, provider type, and primary language of the patient.
Chapter 3

Methods

3.1 Introduction

This study was a secondary analysis from a survey of health care providers (HCPs) who serve patients with low health literacy (LHL) at community health centers (CHCs) in the Midwest region of the United States (U.S.). A descriptive correlational study design was used. The study examined the available LHL resources accessible to HCPs in the CHC setting as well as the effect of geographic location (rural versus urban) and reported primary language of the patient (English versus non-English). This chapter presents the description of the research design, research questions and hypotheses, and the statistical analyses that were used in this study. A summary of the chapter is provided at the end.

3.2 Research Design

This secondary analysis study used a descriptive correlational design to examine CHC resources and support regarding LHL assessment and formal training by geographical location, center size, type of HCPs, and the percentage of patients in their individual patient panels that are non-English speaking. Examination of the CHC resources as it relates to the type of HCP, the location (urban versus rural), and patient language (English versus non-English) provided a basis for further research.

The analysis of existing data offers many advantages to the nurse researcher, who can refine and reanalyze data that can add to the scientific knowledge base. Nurses can answer important questions and maximize opportunities by utilizing data sets readily available for secondary analysis (Castle, 2003). Existing data can be used to answer research questions that
the original research did not ask (Doolan & Froelicher, 2009). The purpose of the original study that preceded this secondary analysis was to determine the overall HCPs’ perception of health literacy seen at CHCs. The objectives of the original study were to determine HCP estimates of LHL, how HCPs screen and assist patients with LHL, what health literacy programs HCPs feel are effective, and what barriers HCPs predict to implement LHL intervention (Schlichting et al., 2007). The data that has been collected provides an opportunity to answer another set of questions that serve specific populations and settings regarding health literacy and vulnerable populations.

3.3 Sample

The original data set consisted of the survey responses from 701 CHC providers located in 49 different CHCs in the Midwest portion of the U.S. who were members of the Mid West Clinicians Network (MWCN). The MWCN is a non-profit organization whose mission is to augment professional and personal growth for clinicians to become successful leaders of their health centers and promoters of quality and community-based primary health care (Network, n.d.). The 49 health centers sampled were located in the following states: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin. Data were collected from both rural and urban settings with significantly higher participation among the MWCN rural health centers, 21 of 29 (72%) versus the MWCN urban health centers, 28 of 68 (41%) \[p=0.005\]. Providers who participated in the study included physicians, nurse practitioners, physician assistants, dentists, dental hygienists, registered nurses, diabetes educators, dieticians, health educators, licensed practical nurses, social workers, and certified medical assistants. A total of 333 eligible respondents completed and returned surveys for a response rate of 47.5%. The majority of the respondents were either physicians (44%) or nurse practitioners (20%).
Because the majority of the respondents to the survey were direct health care providers (physicians and advance practice nurses) the secondary analysis looked more closely at this population. Physician assistants and staff nurses are also included to assure representation of all provider levels that provide direct care in the community health center setting and represent the practice team.

Almost every provider (94 % to 97%) reported using at least one specific method or technique to assist patients who had LHL. The two most commonly used methods to assist patients with LHL were (1) verbally reviewing instructions carefully (95%) and (2) using layman’s terms to describe conditions, treatments, and instructions (95%) (Schlichting et al., 2007). Since the majority of providers reported the use of some type of intervention and there was good representation of both urban and rural health center settings, as well as English and non-English speaking patients, the existing data set was used to answer the research questions for the secondary analysis. The existing data set was used to explore the HCPs’ reporting of health literacy related to the number and types of interventions used, as well as the location of the health center (urban versus rural) and the primary language spoken by the patients reported by the provider (English versus non-English).

3.4 Setting

The HCPs that were surveyed came from 49 different CHCs that were located in 10 Midwest states. The names of potential health care respondents were obtained from the MWCN’s mailing list previously used by 97 organizational members who utilized the MWCN’s patient satisfaction survey (Schlichting et al., 2007). The over representation of the rural health centers provided an opportunity to study a population that has been under represented in prior
health literacy research. These CHCs provided the opportunity to look at the differences and similarities related to health literacy at the point of service for each health care location.

### 3.5 Instrument for Data Collection

The survey was designed by the MWCN Research Committee composed of HCPs, administrators, and clinician-researchers, as well as researchers from the University of Chicago. The development of the survey came about because of an interest in understanding the prevalence and impact of health literacy and its impact on health care in the CHC setting. The committee identified several relevant questions regarding health literacy in CHCs, among them: what were the HCPs’ perceptions of their patients’ health literacy level, how did HCPs assess for LHL, what LHL interventions, if any, were used by HCPs in the community health setting, and what opportunities and barriers are there in providing appropriate care to those patients with LHL. These concerns led to the development of this original survey which was based on health literacy literature as well as the committee members’ experience with health literacy issues (Schlichting et al., 2007).

Approval of the survey and study design was obtained from the University of Chicago’s Institutional Review Board. The survey consisted of 22 items in which the response format was either a five-point rating scale, “check all that apply”, or a yes/no response format. There was one open-ended question at the end of the survey to allow the respondent to add any additional comments or information regarding health literacy (Appendix C). Once finalized among the MWCN research committee members, the survey was presented to a panel of clinicians and health outcomes researchers at the University of Chicago. The panel reviewed the survey and provided useful feedback on item content, clarity and sequencing. The panel made suggestions related to how the clarity of items could enhance reliability. To establish the validity of the
survey, it was piloted on 10 health center clinicians who practiced in an urban out-patient primary care setting at the University of Chicago. The survey was sent to the 10 clinicians, who independently completed the survey and returned it with their attached comments and suggestions. Survey modifications were made in response to the pilot sample to enhance both reliability and validity of the survey instrument (M. Quinn, personal communication, July 9, 2011).

Survey questions.

The first two questions of the survey (Appendix C) asked the HCP to estimate the prevalence of LHL in their practice for both English-and Spanish-speaking patients. The next two questions asked the HCP to describe the extent that LHL interfered with their patients’ ability to understand basic health information, obtain health services, and follow through on recommended treatment. These two questions used a five-point rating scale that measured relative frequency, with response options that ranged from “none” to “a great deal.” The fifth question also used a five-point rating scale measuring relative frequency of use for different ways of assessing LHL. The HCP was asked to indicate how often several different strategies to assess health literacy were used with response options that ranged from “never” to “always.” Question five was used as a dependent variable in this secondary analysis.

The survey also asked about formal health literacy programs that had been implemented at the CHC, and the HCPs perception of how effective the programs have been. The seventh question asked about the interventions the provider used to assist patients that the HCP had identified as having LHL. The eighth question asked the participants to indicate from a list which LHL programs or interventions have or have not been instituted. The other part to this question was asking the participants to indicate how effective they felt the programs or intervention were
if instituted. This was done using a five-point rating scale measuring perceived effectiveness with response options ranging from “extremely effective” to “not at all effective.” Questions six, seven, and eight were used as dependent variables in this secondary analysis. The ninth question asked about interpreter services availability for Spanish speaking patients. Question ten asked the participants to rate perceived helpfulness of each of eight specific LHL programs or interventions presented, using a five-point rating scale with response options ranging from “not helpful at all” to “extremely helpful.” The eleventh question asked the participants to indicate all barriers that they felt kept the health center from implementing formal health literacy program.

The final section of the survey gathered demographic information related to the location of the clinic (rural versus urban), current position at the health center, years of practice, percentage of patients that were non-English speaking, age of patients usually seen in the practice, and the participants gender, age, ethnic origin, and race. This self-administered survey required approximately 15 minutes to complete (Appendix C). Demographic information regarding geographical location of the CHC, current position at the CHC, and the percentage of the patients that were non-English speaking were used as the independent variables in the study.

Survey participants.

The survey was mailed to 803 CHC providers in three waves over a six-month period of time. One hundred and two providers were eliminated after the first survey wave because they were either no longer with the CHC or treated only children. To boost the return rate of non-responders, a two dollar bill was included in the third mailing as an incentive. The overall response rate after three mailings was 47.5% (330 of 701 eligible respondents). The majority of the CHCs that were sent surveys participated in the primary research 47 of 49 (96%). The breakdown of the 330 respondents by profession were physicians 144 (43%), nurse practitioners
67 (20%), dentist and dental assistants 48 (14.5%), physicians assistants 35 (10.6%), registered nurses 4 (1%) and other 32 (9.6%). The respondents that were grouped in the “other” category included certified medical assistants, dieticians, licensed practical nurses, social workers, and administrators. This is comparable to what is reported nationally about the distribution of HCP types. The National Association of Community Health Centers (NACHC) reported that primary care physicians make up 52% of HCPs, followed by mid-level providers (nurse practitioners, clinical nurse specialists, and physician assistants) at 30%, and 18% dental providers. This information helps show that the study sample is comparable to what is seen in health centers across the nation. Interestingly, the NACHC Fact Sheet noted that that the range of non-English speaking patients reported by HCPs is 0-99% (National Association of Community Health Centers, 2009b).

Demographically, women made up 58% of the participants, 74% of the participants were white and the mean age was 45 ±11 years. Fifty-five percent of the participants reported working in an urban CHC and, on average, having been employed in a CHC for 13 years ±11 years.

3.6 Variable Descriptions

The variables for this study came from the original survey with the exception of the CHC size variable. The data for the CHC size came from the Uniform Data System (UDS) data from the year 2006. The UDS data are available from the Bureau of Primary Healthcare located in the U.S. Department of Health and Human Services. Table 3.1 reflects the survey questions used to answer the research questions and whether the survey question represents the independent or dependent variable.
Table 3-1.

*Description of Survey Questions and Independent and Dependent Variables for Analysis*

<table>
<thead>
<tr>
<th>Survey Question number</th>
<th>Survey question</th>
<th>Designation as Independent or Dependent Variable</th>
</tr>
</thead>
</table>
| 5                      | For item #5, please indicate how often you do each of the following to assess health literacy when you are personally caring for patients. (Five point rating scale never to always)  
  - Ask a patient for the last grade they completed.  
  - Have the patient repeat instructions back to you.  
  - Formally assess health literacy with a validated questionnaire.  
  - Use your “gut feeling” as a clinician to assess health literacy.  
  - Other (please specify)                                                        | Dependent Variable                                |
| 6                      | Did you receive any formal training specific to dealing with patients with low health literacy  
  - Yes  
  - No                                                                 | Dependent Variable                                |
| 7                      | Please select the special methods or techniques you use to assist your patients who have low health literacy. (fill in all that apply)  
  - Review instructions carefully with patients  
  - Have patient repeat instructions back to you to check understanding  
  - Describe medical conditions, treatments, and instructions in layman’s terms  
  - Provide patient with health education materials  
  - Provide patient with health education materials designed specifically for patients with low health literacy  
  - Refer patient to other services available  
  - Encourage patients to bring a friend or family member to appointments  
  - Do not use any special methods or techniques  
  - Am not aware of any specific methods or techniques  
  - Other (please specify)                                                        | Dependent Variable                                |
| 8                      | Please indicate in the table below which type of low health literacy program(s) or intervention(s) your health center has instituted (if any) [yes/no], and how effective you believe the intervention has been (Five point rating scale not effective at all to extremely effective).  
  - Formal training in techniques to better assist patients with low health literacy.  
  - Provided patients with health education materials designed                        | Dependent Variable                                |
especially for patients with low health literacy
- Intense, individualized health education session(s) for patients with low health literacy
- Encourage patients to bring a friend or family member to appointments
- Dedicated low health literacy specialist at the center
- Referred patients to social worker or other clinic personnel
- Referred patients to adult education center or other agency for help with language or reading
- Other (please specify)

12. Is your health center in a rural or urban location?
- Rural
- Urban

13. What is your current position at the health center? (fill in all that apply)
- Certified Medical Assistant (CMA)
- Dietician
- Health Educator
- Licensed Practical Nurse (LPN)
- Physician
- Physician Assistant (PA)
- Registered Nurse (RN)
- Registered Nurse Clinician (RNC) / Clinical Nurse Specialist (CNS) / Nurse Practitioner (NP)
- Social Worker
- Administrator (please specify)
- Other (please specify)

16. What percentage of the patients you see are non-English speakers? (Please indicate a percentage between 0 and 100%)

NA. Community Health Center size (information to be obtained from 2006 Uniform Data Systems (UDS) report

3.7 Planned Analysis

For this study, data from the survey were analyzed to describe the resources provided by CHCs regarding LHL. Further analysis examined what LHL interventions were utilized by HCPs within their CHCs, along with the primary language of the patients cared for in this setting. The research questions for this secondary analysis build upon the original research. For this study the participants were limited to the HCPs (physicians, registered nurses, and physician assistants) who responded to the survey and who cared for adult patients. Providers who only treated
children were excluded from the study. The three registered nurses who participated in the original study were included in this secondary analysis with the advanced nurse practitioners and clinical nurse specialists. The data were also analyzed by subcategories to determine the similarities and differences between the different HCPs.

**Pre-analysis testing**

An understanding of how the data were cleaned, coded, and entered into the database is essential when conducting a secondary analysis. The request for the database from the University of Chicago also included a request for the code book. Once obtained, the data was examined to make sure that each variable in the data set was labeled. A complete description of data editing and coding procedures, along with error rates, permits the researcher to further evaluate data quality (Aponte, 2010; Jacobson, Hamilton, & Galloway, 1993). IBM SPSS version 23, a standard statistical software package, was used for all analyses.

Once there was a thorough understanding of how the data were entered and coded, the type and amount of missing data were determined. The extent and impact of the missing data was evaluated in a systematic manner (Hair, Black, Babin, Anderson, & Tatham, 2006). The first step determined the amount of missing data affected the results. If the amount of missing data is under 10% for an individual case or observation, it can be ignored unless the missing data occurs in a nonrandom fashion such as with a specific question or attrition at the end of the survey. List-wise deletion approach was used for data analysis where data from a subject was used for an analysis if the subject provided a response to the variable included in that analysis. The data were evaluated to identify the level of measurement to assure that the correct type of analysis is undertaken (Creswell, 2003).
Prior to any statistical analyses, data were tested to meet the assumptions of parametric statistics. These include normal distribution of the dependent variables, homogeneity of variance and independent observation in each group. Non-parametric equivalents were used on the data that failed to meet the above assumptions. The frequency of HCP responses by CHC size and location and Chi-square statistical tests on HCP type (physician/physician assistant and nurses) versus CHC size and location were analyzed to rule out a confounding effect of nesting of health care providers at CHCs (non-independent variable). A valid proxy measure (size of CHC) was used as a covariate in the regression model to help rule out this confounding factor.

All hypotheses were tested with Alpha set of .05. All null hypotheses were tested. In order to control for Type I error, Bonferroni adjustments were made to the alpha level as necessary.

Statistical tests for question one and corresponding hypotheses.

In order to answer question one, What are the relationships between health literacy assessment, formal training, and health literacy programs and community health center characteristics of geographical, location size, and the proportion non-English speaking of patients seen by providers? To test the corresponding hypotheses, separate unpaired t-tests were conducted to determine the differences in number of health literacy assessment. Chi-square was also conducted to determine the differences in formal training and literacy programs between urban and rural CHCs, large and small CHCs and, those HCPs that reported caring for a high proportion of English speaking and those that cared for a high proportion of non-English speaking patients. Significance level for all tests was set at alpha of 0.05 using a two-tailed test of significance.
Statistical tests for questions two and corresponding hypotheses.

Question 2, What are the relationships between reported low health literacy interventions and community health center characteristics of geographical location, size, and proportion of non-English speaking patients seen by providers? Corresponding hypotheses were tested using separate unpaired t-tests to determine the differences in number of health literacy interventions between urban and rural CHCs, large and small CHCs and, those that reported a high proportion of English speaking and those that reported a high proportion of non-English speaking patients. Significance levels for all tests were set at alpha of 0.05 using a two-tailed test of significance.

Statistical tests for question three and corresponding hypothesis.

In order to test the corresponding hypothesis for question three, Is the use of low health literacy interventions influenced by the community health center’s geographical location, size, availability of low health literacy programs, and the primary language of the patient population served by individual providers? A linear multiple regression analysis was conducted to assess the predictive relationship of CHC location, size, and HCP reported patient language with the use of number of health literacy interventions. Levels of significance were set at alpha of 0.05, using a two-tailed test of significance.

3.8 Ethical Considerations

The participation in the original study was voluntary. The returning of the completed survey implied consent. No physical harm resulted from the collection of the data. Data for this secondary analysis was de-identified and entered into the database for the original study. Approval from Duquesne University Institutional Review Board (IRB) was obtained prior to conducting the secondary analysis. Because the principle investigator of the present study was a co-investigator on the original study, it was not necessary to obtain IRB approval to access data.
from the University of Chicago Biological Sciences Division. An extra copy of the data file was kept on a separate thumb drive to keep the original data intact. There are two copies of the working data kept in two different places in a secure location in the researcher’s office, and on a laptop that is password protected. Upon completion of the study the data set will returned to the University of Chicago.

3.9 Summary

The analysis from the results of the study provided information about health literacy interventions as it pertains to the HCPs practice in a CHC setting. There are many interventional strategies that have been developed to address the patient with LHL; further consideration needs to be given to the implementation of decision support by the CHC. The location of the CHC and the primary language of the patient need to be considered. The results of the secondary analysis identified areas where further study might be useful, particularly regarding interventions for patients in the CHC setting with LHL related to their size, geographic location, and primary language.
Chapter 4

Results

4.1 Introduction

As is the current trend in the PhD Program in Nursing at Duquesne University, Chapters 4 and 5 deviate from the traditional dissertation, which would include the results and analysis in Chapter 4 followed by a Chapter 5 that would include discussion, limitations, conclusions, implications for practice and recommendations for future research. Instead, this final chapter of my dissertation includes the manuscript that will be submitted to a research journal for publication. The manuscript includes an abstract, introduction including review of the literature, methodology, results, and discussion sections. In addition, limitations to the study and conclusions are presented. The chair of my dissertation committee, members of my committee and statistician will be co-authors on the submitted manuscript.

4.2 Manuscript

Abstract
Since 2003, health literacy has become a major focus in health care. Although approximately 21.7 million people currently receive care from community health centers (CHCs) across the United States, few studies have examined low health literacy in these settings or perceptions of health care providers on low health literacy programs and interventions that could benefit patients. Guided by the health care organization and decision support element of the Care Model, the purpose of this study was to examine how characteristics of the health care organization (geographic location, size, provider mix, and percentage of non-English speaking patients seen by a provider) along with decision support (formal training and health literacy programs) are related to productive interactions between the provider and the patients when a variety of health
literacy interventions are used. **Methods.** A secondary analysis was conducted. **Results.** Results indicated that HCPs from rural CHCs used health literacy assessment more than HCPs from urban CHCs ($p = 0.042$). Health care providers from urban CHCs reported that they were more likely to use a social worker ($p = 0.036$). Health care providers from small and medium CHCs had more formal health literacy training ($p = 0.018$). The existence of LHL education ($p = 0.04$), was used significantly more often with non-English speaking patients than English speaking patients. “Repeat back instructions” ($p = 0.007$) and bringing family and friends ($p = 0.001$) were used significantly more with English speaking patients. Results of the multiple regression analysis found that all predictors were significant ($p = 0.000$) and thus explained 60% of the variance. A significant contribution to the model was individual intense patient education ($p = 0.001$). **Discussion.** There is a lot of variability in the LHL interventions used by HCP in the CHC setting. Use of formalize programs and training of HCPs in the CHC setting could help provide support for consistent use of LHL interventions.

**Introduction**

Results of a national study conducted to assess adult literacy in the United States (U.S.) showed that ten million Americans (36%) were found to be at or below basic understanding of health literacy (Kutner et al., 2006). Specifically, 25% of white adults had low health literacy, followed by nearly 50% of Alaskan and Native Americans, 50% of African Americans and more that 66% of Latino Americans (Kutner et al., 2006). Similar characteristics are found in community health centers (CHCs) in which 62% of the CHC patients are members of racial or ethnic minority groups. Currently there are 1,300 CHCs that have nearly 9,000 service sites in the US. The CHCs treated almost 21.7 million people in 2013. Community health centers nationally are staffed by 10,700 physicians, and more than 8,000 nurse practitioners, physician
assistants, and certified nurse midwives. The care provided by the CHC is multi-disciplined and designed to treat the patient in a culturally-competent and accessible manner (2015).

Patients with low or marginal health literacy report poor health status and insufficient understanding of their health care needs. They are also at greater risk for hospitalization (Baker, Parker, Williams, Clark, & Nurss, 1997). Identification of patients with LHL is often hindered because many of these patients go to great lengths to conceal the problem due to shame or feelings of inferiority (Prasauskas & Spoo, 2006). As nurses and other HCPs provide health education, the health literacy status of their patients need to be considered at each encounter (Koh, Brach, Harris, & Parchman, 2013). It is recommended that “Universal Precautions”, a uniform practice of providing patient information in simple, everyday language, should be used with all patients seeking healthcare (Brown et al., 2004). In order to provide quality care and improved health outcomes to medically underserved populations, nurses and other health care providers need ready access to low health literacy strategies and interventions. However, little is known about low health literacy interventions are used by CHC providers, or how these interventions vary by CHC characteristics.

**Review of Literature**

For the most part, health literacy research has been conducted in urban settings (Al-Tayyib, Rogers, Gribble, Villarroel, & Turner, 2002; Baker et al., 2004; Gazmararian et al., 2006; Schlichting et al., 2007; Wilson, Baker, Nordstrom, & Legwand, 2008); few studies have been carried out in rural settings or at CHCs (Harper, Thompson-Robinson, & Lewis, 2003; Hayes, 1998; Schlichting et al., 2007; Sullivan et al., 2011; Wood, 2005). Research to date has not included the size of the CHC as a variable under study or investigated decision support to promote the use of health literacy interventions at CHCs.
Whether or not formal LHL training is provided in rural and urban community health centers or the effects of formal training or adoption of LHL behaviors are used by HCPs over time is not known. However, significant improvements in patient health outcomes have been found after HCPs had formal LHL training (Ferreira et al., 2005; Seligman et al., 2005). Interesting however, participating HCPs of both studies reported feeling less effective in their delivery of care. Results also showed that they overestimated their patients’ health literacy level. The evaluation of formal health literacy training has also been examined in medical students (Harper, Cook, & Makoul, 2007; Hess & Whelan, 2009) and health care workers (Mackert, Ball, & Lopez, 2011). All three training programs included similar training materials and stressed the need for more effective communication. These studies focused on defining LHL and the impact of health literacy had on patient care. Results showed that non-medical terms and the “teach-back” method were the most frequently used interventions with patients with LHL.

Few health literacy studies have focused on HCP-directed LHL interventions. Schlichting, Quinn, Heuer, Schaefer, Drum, and Chin (2007) examined HCPs use of health literacy interventions in a CHC setting, HCPs’ reporting of the prevalence of LHL, of LHL’s effects on patients, and HCPs’ opinions on experiences regarding interventions to help their patients overcome LHL. It is from this study that data were obtained for the secondary analysis conducted in the present study. Results showed that the average HCP reported the level of LHL as over 40%. The majority of the HCPs used some type of intervention to assist patients with LHL; 95% used the interventions, reviewed the instructions carefully with their patients and used layman’s terminology. The HCPs reported barriers in implementing formal health literacy programs including lack of time to screen patients (65%), lack of money (58%), and lack of time to implement a health literacy program (57%). Only seven percent of the HCPs felt that the
senior leadership was a barrier. The majority of the HCPs had no formal LHL training (78%) and felt that the most effective programs to assist HCPs would include a social worker or a LHL specialist. However, hiring additional personnel is not always an option in the CHC setting that care for uninsured and underinsured patients. Alternative methods to accommodate LHL and thus, reduce health disparities and improve health in CHC are needed.

It is also not clear as to the type of low health literacy interventions used when treating patients who speak a different language. Most non-English health literacy research has been conducted with Spanish speaking patients. Several researchers compared English-speaking and Spanish-speaking patients regarding LHL and showed that Spanish-speaking patients were less likely to understand health care terms and had difficulty accessing health care (Brice et al., 2008; Fang, Machtinger, Wang, & Schillinger, 2006; Mutchler, Bacigalupe, Coppin, & Gottlieb, 2007). The Spanish-speaking patient also had more difficulty obtaining an appointment, understanding instructions, or receiving help from an interpreter. Lack of understanding of health information by the patient leads to adherence issues and poorer health outcomes (Britigan, Murnan, & Rojas-Guyler, 2009). In a matched pair cohort design comparing the levels of health literacy Brice and colleagues (2008) discovered that 74% of the Spanish-speaking cohort had LHL compared to only 7% of the English-speaking cohort. Little information is known in regard to ways by which HCPs promote health literacy related to primary language, reading level, geographic location, different Spanish dialects, and effectiveness of LHL interventions in Spanish-speaking patients (Brice et al., 2008; Britigan et al., 2009; Leyva, Sharif, & Ozuah, 2005).

Clearly, there are many gaps in the literature related to LHL in CHCs. Health literacy poses a challenge to a significant number of patients served at CHCs (Sullivan et al., 2011). Specific health literacy programs need to be designed to assist HCPs in CHC settings. However,
before programs can be developed, a better understanding of the relationships between CHC contextual characteristics (e.g. geographical location, size, primary language of the patient, and HCP type), the decision support provided (health literacy assessment, formal training, and health literacy programs), and LHL interventions used by the HCPs is needed.

**Conceptual Framework**

In order to provide quality care, it is imperative that HCPs are able to effectively interact and communicate with patients with LHL. The Care Model, developed by Wagner and associates (1999), supports this assertion and was used to guide this study. This model has been extensively used in CHC research (Chin et al., 2004; Chin et al., 2007; Haggstrom, Taplin, Monahan, & Clauser, 2012; Mackey et al., 2012) and consists of six elements including the health system, clinical information systems, decision support, delivery system design, self-management support, and community resources (Wagner et al., 2001). The two overarching elements; the health system, considered the health care organization and the community, specific to resources and policies, are considered the major elements of the Care Model. The remaining four elements focus on the clinical practice of the health system including: self-management support, delivery system design, decision support, and clinical information systems. These four clinical practice elements are required for productive interactions to come about between the patient and the practice team. The use of these six elements subsequently leads to improved health outcomes. Proactive interactions can only occur when the practice team is prepared and proactive, and the patient is informed and activated. This is the responsibility of both the individual provider and the leadership of the health system.

The specific concepts in the Care Model that were used to direct this project were the **health care organization, decision support, and productive interactions.** The CHC, as the
health care organization, must communicate clear goals that are congruent with the health organizations mission, policies and procedures. The CHC’s senior leadership must be committed to quality care by providing support and resources necessary to promote the health of the patients being cared for (Wagner et al., 2001).

The integration of health literacy regarding assessment and the establishment of LHL programs and interventions at the organizational level are decision support components, intended to assist with productive interactions leading to improved patient health outcomes (Pasricha et al., 2013). The practice team needs to be educated to encourage patient questions and effective use of educational materials based on the patient’s needs. Finally, productive interactions are possible when the practice team has the necessary knowledge from the community, the right information, adequate time and resources to assure quality. The patients must be provided with accurate information and confidence in order to be informed and an active participant in their care (Austin, Wagner, Hindmarsh, & Davis, 2000) and, in the context of patients with low health literacy, are evidenced by implementation by individual providers of a variety of low health literacy interventions.

Therefore, the purpose of this study was to examine how characteristics of the health care organization (geographic location, size, provider mix, and percentage of non-English speaking patients seen by providers) along with decision support (formal training and health literacy programs) are related to productive interactions between the provider and the patient when a variety of health literacy interventions are used.

Methods

A descriptive correlational design was conducted through a secondary analysis using data collected in a survey that initially examined HCPs perceptions of LHL and their effects on
patients (Schlichting et al., 2007). Approval from Duquesne University Institutional Review Board (IRB) was obtained prior to obtaining the database and conducting the secondary analysis. Because the principle investigator of the present study was a co-investigator on the original study, it was not necessary to obtain IRB approval to access data from the University of Chicago Biological Sciences Division.

The original study consisted of 701 HCPs from 49 CHCs located in the Midwest United States (U.S.). A total of 333 eligible respondents returned completed surveys for a response rate of 47.5%. The researcher-generated survey (Schlichting et al., 2007) consisted of 22 items that assessed areas related to the HCPs perceived level of LHL in their CHC, strategies used by HCPs to assess and address LHL, HCPs use of formal LHL training individually and at the CHC level, perceived barriers to implementing LHL programs as well as success of such programs, and demographic information. The specific items on the tool used to answer the questions for this secondary analysis were limited to the questions related to health literacy assessment, formal training, specific interventions, and programs. Demographic information were viewed as independent or predictor variables and included the location of the CHC (rural versus urban), the size of the CHC (small, medium, or large), provider type (physician, physician assistant, or registered nurse), and the percentage of non-English speaking patients seen by providers.

For the present study specific variables from the Care Model were selected and operationalized. The health care organization was the characteristics of the CHC, specifically geographic location, size, primary language of the patient population served by individual providers, and provider type. Geographic information was obtained from the survey which asked if the CHC was urban or rural. The size of each CHC was determined by the number of individual patients cared for in a given year. A small CHC served less than 5,000 patients, a
medium CHC between 5,000 to 10,000 patients, and a large CHC over 10,000 patients (Cunningham, Lara, & Shin, 2011). The health center size was determined by the 2006 Uniform Data System Report obtained from the Department of Health and Human Services. There were nine small CHCs, 10 medium CHCs and 27 large CHCs. The small and medium CHCs were combined into one group due to the limited number, creating two dichotomized groups, 10,000 patients or less versus more than 10,000 patients. The HCP type was selected by the participants from a list of possible positions at the health center. The responses from the list in the original study included physician, physician assistant, registered nurse, registered nurse clinician, clinical nurse specialist, and nurse practitioner who cared for adult patients. The primary language of the patients at the CHC was determined by participants reporting their perception of the percentage of patients in their individual patient panels that were non-English speaking. This response could range from 0 to 100%.

**Decision support** was defined as system-level interventions, implemented across the health center, to include health literacy assessment, formal health literacy training, and the availability of CHC supported health literacy programs. Health literacy assessment was comprised of responses to the survey questions regarding how often the HCP assessed patients’ health literacy using one of five different strategies. The five health assessment strategies included in the survey were: ask a patient for the last grade they completed; have a patient repeat instructions back to you; ask a patient if they understand instructions or have any questions; formally assess health literacy with a valid questionnaire; and, use your “gut feeling” as a clinician to assess health literacy. A five-point rating scale was used to measure relative frequency, the response options ranged from “never” to “always” for each assessment strategy. A health literacy assessment composite score was tallied for each provider that ranged from five
Data regarding formal health literacy training and health literacy programs provided by the CHC organization was obtained from the survey question related to the CHC providing formal training techniques and health literacy programs to better assist the patient with LHL, each provider was given a point for answering yes to this question. The health literacy programs that were listed on the survey included: provided patients with health education materials designed especially for patients with low health literacy; intensive individualized health education sessions(s) for patients with low health literacy; encourage patients to bring a friend or family member to appointments; dedicated low health literacy specialist; referred patients to social worker or other clinic personnel; and referred patients to adult education center or other outside agency for help with language or reading.

**Productive interaction** was measured by the individual health care provider’s responses regarding the use of LHL interventions. Each provider was asked to select all of the LHL interventions they used from a list of seven. The responses included reviewing instructions; repeating back instructions; use of layman’s terms; giving patients educational material; providing educational material designed for patients with LHL; referral to other series; and, encouraging the patient to bring family and friends to the appointment. The health literacy intervention composite score was calculated by summing all “yes” answers for each on the interventions selected. This composite score was tallied and ranged from zero (no interventions selected) to seven (all interventions selected).

The estimated prevalence of LHL in the original study ranged widely across CHCs for both English and Spanish speaking patients (0 to 100%), with the median prevalence estimated by the survey respondents as 40% and 50% respectively (Schlichting et al., 2007). The CHCs were
similar in location; 21 CHCs were classified as rural and 28 CHCs as urban. The similarity in numbers of the two groups of CHCs provided an opportunity to study the existence of different LHL interventions employed by HCPs in relation to the geographic setting. The diversity of the participating CHCs regarding the primary language of patients (0 to 100%), also provided an opportunity to examine the possible difference in LHL interventions used by the HCPs in the CHC setting related to the percentage of patients in their individual patient panels who are non-English speaking (Schlichting et al., 2007). HCPs responded to the survey question regarding the percentage of non-English speaking patients. As per the directions on the survey, non-English speaking patients referred only to their patients who spoke Spanish as their primary language.

The research questions for this secondary analysis were: 1) What are the relationships between health literacy assessment, formal training, and health literacy formal programs and CHC characteristics of, geographical location, size, and the proportion of non-English patients seen by providers? (Health Care Organization) 2) What are the relationships between reported LHL interventions and CHC characteristics of geographical location, size, and proportion of non-English patients seen by providers (Decision Support) 3) Is the use of LHL interventions influenced by the CHC’s geographical location, size, availability of LHL programs, and the primary language of the patient population served by individual providers? (Productive Interactions).

Sample

The sample population of HCPs for this study differed slightly than the original study that consisted of 333 HCPs which included physicians, registered nurses, dentists, dental hygienists, diabetes educators, dieticians, health educators, licensed practical nurses, social workers, and certified medical assistants. For this present study HCPs were defined as physicians (doctor of
medicine or osteopathy), registered nurses (advance practice nurses and staff nurses), and physician assistants. Based on the small to medium strength of association with the original study (Schlichting et al., 2007) \((r = 0.25)\), a power analysis determined that a sample size of 195 was needed to achieve a power of .80 using a two tailed test of significance with alpha set at .05.

**Data Analysis**

The IBM SPSS version 23 was used to analyze data. Data were first tested to determine if the assumptions of parametric statistics were met including normal distribution of the dependent variables, homogeneity of variance, and independent observations in each group.

Chi-square tests were used to determine the differences in existence of formal training and literacy programs between HCPs practicing in urban and rural CHCs, large and small/medium CHC’s and the primary language of the patient population served by individual HCPs. Independent t-tests were used to determine the differences in number of health literacy assessments. To determine the differences in number of health literacy interventions between HCPs at urban and rural CHCs, large and small/medium CHC’s, those that reported a high proportion of English speaking patients seen by providers and those that had patient panels with a high proportion of non-English/Spanish speaking patients independent t-tests were also used. To assess the predictive relationship of CHC location, size, and primary language of the patient population served by individual providers with the use of a number of health literacy interventions, simultaneous multiple regression analysis was conducted. The use of these secondary data did not account for nesting of respondents at CHCs (non-independent variable). To rule out this potentially confounding factor, the distributions of physicians and nurses across different sizes and different locations of CHCs were examined and the size of the CHC was viewed as a proxy measure for the non-independent variable were used as a covariate in the
regression model and thus rule out potential bias. Consequently, the frequency of provider responses by CHC size and location and Chi-square statistical tests on provider type (physician/physician assistant and nurses) versus CHC size and location were analyzed.

Results

Socio-demographic Characteristics

Responses from a total of 251 HCPs were included in the secondary analysis. The HCPs were mostly non-Hispanic (n = 233, 95%) and middle aged (Mean = 54 years, SD = 10.4). The majority of HCPs were Caucasian (n = 191, 76%), although Asian (n= 24, 9.6%) and African Americans (n= 18, 7.2%) were also represented. Sixty percent of HCPs (n=151) were females. The sample population for the secondary analysis was drawn from 47 of the 49 CHCs that participated in the original study. Two CHCs were eliminated from analysis because they did not meet the definition for this study. Using the 2006 UDS report, the mean Hispanic/Latino CHC population was 2.1% with a SD of 6% and a range of 0 to 38.4%. There were 143 respondents from urban CHCs and 100 respondents from rural CHCs. Small and medium CHCs respondents were combined (89 HCPs) due to the limited number and there were 162 respondents from large CHCs. Respondents indicated serving patients of mostly all age groups (n = 175, 70%), with very few exclusively serving a pediatric population (n = 10, 4%) or just adults (n = 65, 26%). Sixty percent of the sample were physicians (n=151), 25.5% were Registered Nurses (n= 64), and 14% were physician assistants (n=35).

The sample was analyzed for possible distribution bias regarding CHC location and size. For location, there were 243 respondents (8 cases were missing due to missing values for location). Of the 243 respondents, 62 (26%) were nurses and 181 (74%) were physicians and physician assistants (physician group). Of the 62 nurse respondents, 22 (35%) were from rural CHCs and 40 (65%) were from urban CHCs. Of the 181 in the physician group, 78 (43%) were
from rural CHCs and 103 (57%) were from urban CHCs. Of the total 243 respondents, 100 were from rural CHCs, including 22 (22%) nurses and 78 (78%) in the physicians’ group; 143 were from urban CHCs, including 40 (28%) nurses and 103 (72%) physician’ group. Results of a 2x2 Pearson chi-square analysis showed that this distribution of nurses and the physician group across CHC locations was not significantly different from one another chi-square [1] = 1.104; \( p = 0.293 \). For CHC size, that there were 251 respondents (no missing cases). Of the 251 respondents, 66 (26%) were nurses and 185 (74%) were in the physician group. Of the 66 nurse respondents, 25 (38%) were from small/medium CHCs and 41 (62%) were from large CHCs. Of the 185 in the physician group, 64 (35%) were from small/medium CHCs and 121 (65%) were from large CHCs. Of the total 251 respondents, 89 were from small/medium CHCs, including 25 (28%) nurses and 64 (72%) in the physician group. In addition, 162 respondents were from large CHCs, including 41 (25%) nurses and 121 (75%) from the physicians’ group. Results of a 2x2 Pearson chi-square analysis show that this distribution of nurses and physician group across small/medium versus large CHCs is not significantly different than expected (chi-square \( p = 0.229; \ p = 0.632 \)). The overall distribution of the HCP type remained consistent across location and size suggesting less likelihood of the results being confounded.

As in the original study, the percentage of patients seen by the individual at the CHC, who were non-English speaking, ranged from 0 to 100 percent. The sample for this study was similar to the original sample in that the majority of the respondents were female, white, and middle aged. However, the mean age of participants in the secondary analysis was slightly older (54 years of age versus 45 years of age) (Schlichting et al., 2007). The difference in the mean ages was a result of eliminating CHC support personnel from the analysis because they did not meet the definition of an HCP for the present study. The providers’ estimates of LHL prevalence
for the present study was slightly lower for English and Spanish speaking patients and were 39% (Range 15 to 63%) and 45% (Range 15 to 75%), respectively compared with the original study of 41 (Range 17 to 65%) and 48 (Range 18 to 78%). Assumptions of parametric statistics were met.

Regarding the existence of CHC sponsored LHL training and programs: 35 (14%) of the HCPs reported formal training from the CHC. Concerning organizational health literacy programs, HCPs reported that 34% (n = 85) had intensive individualized health literacy education sessions for patients with LHL and 6% (n = 16) had a dedicated LHL specialist at the CHC. HCPs were asked to report on their frequency of using five specific health literacy assessments, using a five point rating scale with 1 indicating “never used” and 5 “always used.” HCPs reported that they most often used “asking a patient if they understand instructions or have any questions” and “formally assess health literacy with a valid questionnaire” least often. Results are reported in Table 1.

An analysis of variance (ANOVA) was conducted to provide information about the distribution of HCPs within CHCs and the use of LHL interventions. No statistical significant differences were found in the mean number of interventions by provider type (p = 0.449). Table 2 shows the mean, standard deviation, and range of the number of interventions by provider type.

**Results of Major Variables under Study**

Chi-square tests were used to answer question one about the characteristics of the health care organization. Specifically, what are the relationships between health literacy assessment, formal training, and health literacy formal programs and CHC characteristics of, geographical location, size, and the proportion of non-English patients seen by provider. Separate independent t-tests were used to determine the differences in the number of health literacy assessments and
existing LHL programs. A low health literacy assessment composite score was created to measure the relationships and the Cronbach alpha was 0.171 for this composite score.

Comparisons are presented in Tables 3 through 5. As noted in Table 3, no significant differences in mean scores were noted between small to medium and large CHCs for the health literacy assessment composite score. Although a statistically significant ($p = 0.01$) relationship was found between the health literacy assessment composite score and percentage of non-English speaking patients in CHCs, the magnitude of the relationship was not strong (Spearman’s $Rho = 0.20$). Statistically significant differences were noted between rural and urban HCPs for the assessment composite mean scores ($p = 0.04$). As shown in Table 4, HCPs from rural CHCs reported that they conducted health literacy assessments significantly more frequently than did HCPS from urban CHCs ($p = 0.042$). The effect size of this mean difference, a measure of its clinical significance, was calculated to be 0.27 (Cohen’s $d$), a small to medium effect (Cohen, 1977).

Statically significant differences ($p = 0.018$) were found in regard to formal health literacy training between HCPs from small to medium CHCs versus large CHCs. While receiving formal training was low across the CHCs regardless of size, only around a third ($n = 18, 32\%$) of the HCPs at small to medium CHCs reported having formal training compared to less than one in five HCPs from larger CHCs ($n = 33, 17\%$). Statistical significant differences were also found between rural and urban HCPs and use of an existing social worker as a referral agent who was used more frequently by HCPs in urban CHCs than in rural CHCs ($p = 0.04$). Similar differences were noted in the percentage of CHC providers’ non-English speaking patients versus English speaking patients. The use of LHL educational material ($p = 0.04$), was used significantly more often by HCPs with non-English speaking patients as shown in Table 5.
Independent t-tests were used to answer question two in regard to decision support: What are the relationships between reported LHL interventions and CHC characteristics of geographical location size, and proportion of non-English patients seen by providers? A low health literacy interventions composite score was created to measure the relationships. Internal consistency reliability (Cronbach alpha) was 0.55 for this composite score. Comparisons are presented in Tables 6 through 7. On average five interventions were used by HCPs regardless of the CHC’s geographical location or size as noted in Table 6. The correlations between proportion of patients whose primary language was not English and the health literacy intervention composite score of numbers of LHL interventions used were not significant. There were three LHL interventions that were used by almost all HCPs including: reviewing instructions carefully (n = 243, 97%); use of health education material (n = 217, 86.5%); and, using layman’s terms (n = 242, 96%). The other four LHL interventions were used less frequently including; having the patient repeat the instructions back (n = 176, 70%); use of LHL health education materials (n = 92, 37%); referral to other services (n = 140, 56%); and, bringing family and friends (n =177, 70.5%) to the visit. No significant differences were noted.

Data did not allow for defining what constituted a non-English or English speaking CHC. In order to examine the relationship between the LHL interventions and non-English speaking patients who were treated at the CHCs, the reported perceived percentage of non-English speaking patients seen by the individual HCP was used as the dependent variable and the use or non-use of the interventions was used as the independent variable. Statistical analysis found that there were two interventions, having the patient repeat information back ($p = 0.006$) and bringing family or friends to the visit ($p = 0.001$), that were used more often by HCPs with English speaking patients compared to non-English speaking patients, as shown in Table 7.
Multiple regression analysis was used to examine productive interactions as per question three: Is the use of LHL interventions by different HCP types influenced by the CHC’s geographical location, size, availability of LHL programs, and the primary language of the patient population served by individual providers? Results of the regression analysis showed that all predictors, when included in the regression model simultaneously, were significant \( (p = 0.000) \) predictors of number of health literacy interventions used. Findings from the regression analysis are presented in Tables 8 and 9. Together, the predictors were able to explain 60% of the variance in the data (Table 8). However, only intensive individual education \( (p = 0.001) \) made a significant contribution to the prediction model. The type of provider, size and location of the CHC, health literacy training and percentage of non-English speaking patients in the CHCs did not make a contribution to the prediction. As seen in Table 9, the positive beta coefficients associated with each significant predictor indicates that with the implementation of each program, the number of health literacy interventions used increased. These data did not make up an independent sample because respondents were nested within the CHCs and because of the different provider mixes at each CHC. Consequently, health center size (small/medium versus large CHCs) and HCP type by the distribution of respondents at each CHC were analyzed to determine if data were confounded by the nesting. The regression analysis did not show a significant effect for the CHC based on size.

**Discussion**

The Care Model (Wagner et al., 2001) guided the secondary analysis by focusing on the decision support element regarding formal health literacy training and programs. This study examined the reported health literacy resources and LHL interventions (decision support) used at CHCs in regard to size, geographical location, provider type, and the percentage of non-English
speaking patients. Results in regard to geographic location of the CHCs were mixed. It was thought that because of the extensive use of urban centers in health literacy research (Coughlin et al., 2006; Funnell et al., 2008; Persell, Osborn, Richard, Skripkauskas, & Wolf, 2007; Wilson et al., 2008), HCPs from urban CHCs would have had more access to LHL training, programs, and interventions. Contrary to this however, results showed that HCPs from rural CHCs were more likely to assess for LHL, and that they used the “repeat-back” intervention significantly more often than did HCPs from urban CHCs. Health care providers from urban CHCs were significantly more likely to use the services of health literacy specialists and social workers compared to HCPs from rural CHCs that did not use these services but rather provided interventions on their own such as the “teach-back” intervention. Although the reason for this is not known, it may be related to finances and thus, the lack of services available at rural CHCs. These results are consistent with the perception that urban health centers have more specialty personnel available to provide services (Shin, Sharac, & Mauery, 2013). Nevertheless, the HCPs from urban CHCs did not use more LHL interventions. Other potential explanations include a decrease in knowledge and LHL training of HCPs in urban CHCs compared to rural CHCs because of the higher vacancies and turnover rates (2009). Further review of the literature found that rural areas had a more difficult time retaining HCP’s (Savageau, Ferguson, Bohlke, Cragin, & O’Connell, 2011). The HCP who starts working for a CHC at a younger age is 1.22 times more likely to leave than an older HCP. The average length of time a HCP remains at a CHC is three years; however if an HCP stays at a CHC for more than five years, the retention rate increases accordingly (Hing, Hooker, & Ashman, 2011). In this study the HCPs were not young and had been employed at the CHC for an average 10 years. Without further research, there is no explanation as to why urban CHC HCPs use less LHL interventions.
Although the Care Model is used as the practice model in many CHCs, it was not possible to determine via the secondary analysis which of the HCPs participating in the study were from CHCs that use the Care Model. If indeed this were known, further insight into the existence of LHL interventions versus health literacy programs used by HCPs in urban and rural CHCs would be possible. According to the Care Model, the health system leadership is responsible for providing the resources to assist with practice changes needed to assure quality. Therefore, it is vital that the leadership at CHCs provide the resources to the HCPs to assist with practice changes that will lead to a prepared, proactive practice team (Bond, Haynes, Toof, Holmberg, & Quinteros, 2013). Recently there has been a campaign for CHCs to adopt a health literacy hybrid of the Care Model (Koh et al., 2013). Koh and colleagues (2013) provided information on how health literacy evidence and strategies can be incorporated using the Care Model. It is through the element of decision support that the HCP gains access to the resources and information needed to provide quality care (Wagner et al., 1999). Koh et al. (2013) suggested that health literacy training needs to be organization-wide. Two programs that could be easily adopted with minimal expense are health literacy programs such as the American Medical Association “Health Literacy Introductory Kit” (Foundation, 2007) or the 2010 Agency for Healthcare Research and Quality (AHRQ) “Health Literacy Universal Precautions Toolkit” (DeWalt, 2010). Each of these tool kits provides self-directed learning and can be obtained by CHCs for minimal or no cost. The toolkit provided by AHRQ is a web-based interactive program with the potential to benefit all CHC personnel. If a health literacy program were organizational policy instituted at CHCs then there may be an increase in the number of LHL interventions used, improvement of productive interactions and thus, better health outcomes. Regression analyses found that the use of intense individualized health education (p=0.001) significantly
increased the use of LHL interventions by the HCPs. Health care providers often presume to know their patients’ level of health literacy and some patients tend to hide their LHL status from their provider (Davis, Michielutte, Askov, Williams, & Weiss, 1998; Parikh, Parker, Nurss, Baker, & Williams, 1996). This lack of awareness on the part of the HCP may lead to less than optimal productive interaction and misunderstandings (Gazmararian, Williams, Peel, & Baker, 2003; Scott, Gazmararian, Williams, & Baker, 2002).

Statistical analysis showed that the size of the CHC had very little influence on the HCPs’ assessment of health literacy or the existence of LHL programs. However, results also showed that HCPs at small or medium CHCs were statistically more likely to have LHL training and formal LHL programs compared to large CHCs. Regardless of these findings, size of the CHC did not contribute to the predictability of LHL intervention use in the regression analysis and thus, indicates that the size of the CHC has little impact on the use or non-use of LHL interventions. No research could be found that scrutinized the size of CHCs and the use of LHL interventions. To date, this is one of the first studies to examine the potential impact that the size of a CHC may have on the health care organization support or use of LHL interventions. Further research is needed to determine impact of size of CHCs on health literacy performance guidelines through organization-wide training. As per the Care Model, health literacy training may help in promoting changes in the CHC practice team’s behavior and improve outcomes for an informed activated patient (Koh et al., 2013; Pasricha et al., 2013). Because CHCs have an increase in HCP vacancies and turnovers it is important that the CHC leadership provide ongoing health literacy programs and LHL interventions to the practice team (Savageau et al., 2011; Singer, Davidson, Graham, & Davidson, 1998) The implementation of organizational health literacy policies will help the practice team to be prepared and proactive. These policies
might include the ready availability of LHL educational material written at the appropriate grade level, focusing on strategies that improve medication adherence (having the patient bring all medication to each visit), or the use of alternative educational methods such as the use of pictures and videos (Koh et al., 2013).

Results also showed that five of the seven LHL interventions including reviewing instructions carefully, repeating back instructions, use of layman’s terms, providing health education materials, and encouraging the use of family or friends were perceived by HCPs to be used most frequently. As in the original study (Schlichting et al., 2007), three interventions including reviewing instructions carefully, use of layman’s terms, and providing health education materials were used by the majority of HCPs in the present study. In order to further determine the specific LHL interventions most frequently used with English-speaking patients compared to non-English speaking patients, the three LHL interventions were eliminated to reduce the number of variables for the purpose of analysis. Consequently, a significant difference was found between those interventions used by providers for English-speaking versus non-English speaking patients. Specifically, repeating back instructions and encouraging the use of family and friends were significantly used more frequently with English-speaking patients. This is an interesting finding and contrary to what was expected. Upon reflection as a past clinician in a CHC, it is thought that these results might be due in part to an expectation commonly held by many who work in CHCs. Specifically, it is expected that a non-English speaking patient bring a family member or a friend to the appointment to assist with translation. None of the individual LHL interventions used by HCPS were found to be significant for non-English speaking patients. When HCPs were asked what types of LHL interventions were available at their CHC for non-English patients, three LHL interventions were identified including use of LHL educational
materials, dedicated LHL specialist, and referring patients to a social worker. Only referral to a social worker achieved significance. The availability of LHL educational material may be related to the existence of information in the patient’s native language. The dedicated LHL specialist and social worker could be viewed as programs that could benefit HCPs treating non-English speaking patients. Recent studies conducted in the U.S. have found that patients who are Spanish-speaking experience greater misunderstanding of health information and have limited access to health care compared to English-speaking patients (Brice et al., 2008; Fang et al., 2006; Mutchler et al., 2007). Clearly more research is needed in this area to determine the types of health literacy interventions that could be best presented for non-English speaking patients and would thus benefit non-English speaking patients receiving care at CHCs. In addition, interventions need to be presented in a culturally appropriate manner. Although cultural appropriateness of interventions were not addressed in this study, Zaarcadoolas and colleagues (2005) believe that about 40% of the medication errors and poor adherence by patients with LHL could be avoided if language and cultural differences were addressed appropriately. When a patient seeks care, the CHC organization, needs to make sure that the HCP has the resources needed to provide the patient with information in a manner that is understandable to the patient and family (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011).

The simultaneous multiple regression analysis indicated that resources made available by the CHC or health organization were predictive of HCPs using the LHL intervention, intense individual education. It is important that HCPs become experts at implementing LHL interventions that assist patient in understanding their treatment plan. The use of one-on-one educational sessions has been found to be beneficial for all patients’ regardless of their health literacy status (DeWalt et al., 2006). This is congruent with the Care Model. Wagner (2010)
encouraged practice teams to attend formal training and programs presented by experts to aid the HCP in the decision making process. These results support Koh and colleagues (2013) recommendation that CHCs should promote the use of LHL interventions into the care of all patients. This systematic inclusion of LHL interventions may better assure productive interactions between the practice team and the patient (Dancer & Courtney, 2010). Several researchers that have used the Care Model to guide their research evaluated the use of decision support strategies, primarily evidence-based guidelines (Chin et al., 2007; Haggstrom et al., 2012; Mackey et al., 2012). Each noted improvement in clinical outcomes, but none reached statistical significance. Further longitudinal research using the Care Model is needed to determine if changes based on evidence-based health literacy guidelines can improve clinical outcomes over time. Knowledge of the CHC patients’ LHL status is important because LHL poses an additional challenge to patients (Sullivan et al., 2011). The nurse in most cases is the first member of the practice team to interact with the patient and provide information about their treatment plan and medications. The use of universal precautions (use of LHL interventions for all patients) is needed to avoid misunderstandings about the administration of medications, diagnostic tests and implementation of self-management goals (Pawlak, 2005). Identifying LHL practices that are evidence-based can help guide the development of health literacy policies and CHC education programs that provide information regarding health literacy to CHC staff.

**Limitations**

There are several limitations to this study. Because this was a secondary analysis there was no control over how the data was collected or the sampling frame. There were also limitations with the survey. One limitation is that the original survey did not elicit information about the native language of the HCP and their ability to speak or understand the Spanish. This
limited the ability to understand what effect the language of the HCP may have had on the use of LHL interventions with non-English speaking CHC patients. Language was further limited because the sample was not independent. Each HCP provided their perceptions of their patients who were non-English speaking. Even across CHCs the percentage of non-English speaking patients cared for was not consistent. This limitation was addressed by using the average number of non-English speaking patients as a continuous variable. CHCs could not be viewed as independent because several HCPs responded from within their respective CHC. Therefore, the size of the CHC was treated as a covariate in the regression analysis. The results of the regression showed an insignificant effect for the CHC, the results are less likely to be confounded by the nesting of the HCPs within the CHC, yet it cannot be completely ruled out.

The composite score for LHL assessment had low internal consistency reliability (Cronbach alpha = 0.171) There were a limited number of LHL interventions included in the survey; interventions were limited to personal contact and written material interventions The results could also have been effected because the survey did not include all possible LHL interventions, thus, the HCP could have used other LHL interventions not listed on the survey. As Schlichting et al. (2007) addressed in the original study, generalizability is also a limitation because the study sample was taken from HCPs practicing in the Mid-West region of the country and urban CHCs were under represented. Additionally, there was some concern about selection bias, as those HCPs who returned the survey may have been more aware of health literacy issues than those who did not return the original survey. The heightened awareness on the part of the HCPs that did participate may have caused an overestimation of the HCPs health literacy screening and LHL interventions.
Recommendations

Further research is needed to determine the effectiveness of organizational wide training of LHL formal training programs differ by geographical location (urban/rural) on practice teams behaviors and patient health outcomes. Further information is also needed regarding how to increase the number of LHL interventions used by HCPs particularly in the urban setting. Research is needed to determine what approach used by the practice team would best promote active participation of the patient as well as which low health literacy interventions would the patient want included. Very little research has been conducted including the size of the health care organization; consideration should be given to investigating the impact size might have on the institution of health literacy decision support policies and the effectiveness of low health literacy interventions. Additional research is still needed to ascertain the effects of CHC or HCP characteristics on the use of health literacy training at small and medium CHCs. Patients with LHL tend to have difficulty in understanding health issues including, medication administration, treatment directives and recommendation. It would also help to have a better understanding of interventions that would best benefit patients with LHL and especially those whose primary language is not English. Regardless of the primary language of the patient, research is needed to further determine the health literacy skills needed by HCPs and the demands LHL place on the Health center organization. From the standpoint of the Care Model, longitudinal research studies regarding the implementation of health literacy decision support policies such as formal health literacy training programs need to be conducted. Furthermore health literacy decision support strategies need to be implemented by all CHC organizations leadership. Research has shown that the dedication to the use of decision support strategies has assisted the practice team and the patient in attaining improved outcomes (Chin et al., 2007).
Conclusion

Guided by the Care Model, the results of this secondary analysis added to the body of knowledge in regard to the characteristics of the CHCs and whether or not these characteristics made a difference in the reported use of LHL interventions, existence of health literacy formal training, programs or assessment. Significant differences were found between HCPs from urban and rural CHCs, and HCPs reported use of LHL interventions in English versus non-English speaking patients. This study demonstrated that HCPs are more likely to use LHL interventions when LHL education materials are available, family and friends are present, and a social worker is available for referrals. If universal precautions are used by HCPs at CHCs as suggested by Brown et al. (2004), communication between the HCPs and patients may be enhanced, potentially leading to a more productive interaction and better health outcomes for the patient. This study showed that those HCPs from small/medium and rural settings that perceive themselves as having an understanding of health literacy also perceive themselves as providing care with less support from other CHC personnel. These results support the need for formalized health literacy training at CHCs. This training would help the CHC who may have limited resources and thus, few support personnel. More formalized decision support strategies need to be developed to provide the evidence-based guidelines that could be implemented at all CHCs. Health care providers are integral to the implementation of LHL interventions across the CHC. In particular, the nurse’s role advocates for the patient, assuring that all learning needs are identified, the correct educational is used at each visit and that the patient understands and can initiate the recommended plan of care. From a practice perspective, formal health literacy training programs are needed and should be implemented by the CHC leadership to improve communication barriers between the practice team and the patient. The use of evidence-based
health literature interventions will further assist the HCPs to be a prepared, proactive, practice team and the patient to be informed and activated.
Reference List for Manuscript


<table>
<thead>
<tr>
<th>Strategies</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask a patient for the last grade completed</td>
<td>248</td>
<td>2.76</td>
<td>1.16</td>
<td>1-4</td>
</tr>
<tr>
<td>Have patient repeat back instructions</td>
<td>248</td>
<td>3.246</td>
<td>0.83</td>
<td>1-4</td>
</tr>
<tr>
<td>Ask patient if they understood Instructions or had questions</td>
<td>248</td>
<td>4.545</td>
<td>0.60</td>
<td>1-3</td>
</tr>
<tr>
<td>Formally assess health literacy with a valid questionnaire</td>
<td>248</td>
<td>1.444</td>
<td>0.80</td>
<td>1-4</td>
</tr>
<tr>
<td>Use “gut feeling” to assess health literacy</td>
<td>249</td>
<td>3.723</td>
<td>0.92</td>
<td>1-4</td>
</tr>
</tbody>
</table>

*Note. A five point Likert-type response scale was used with 1 = “never used” and 5 = “always used.”*
Table 2. Community Health Center Provider Type by the Number of Individual Low Health Literacy Interventions Used

<table>
<thead>
<tr>
<th>Provider Type</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician</td>
<td>151</td>
<td>5.07</td>
<td>1.396</td>
<td>0-7</td>
</tr>
<tr>
<td>Physicians’ Assistant</td>
<td>35</td>
<td>5.4</td>
<td>1.265</td>
<td>2-7</td>
</tr>
<tr>
<td>Registered Nurses</td>
<td>64</td>
<td>5.07</td>
<td>1.515</td>
<td>0-7</td>
</tr>
</tbody>
</table>

*Note.* Physicians included (doctor of medicine or osteopathy); Registered Nurses included (advance practice nurses, nurse practitioners, clinical nurse specialists, and staff nurses). No statistical difference was found in the mean number of interventions by provider type ($p = 0.449$).
Table 3. Comparison of Health Assessment, Health literacy Training, and Health Literacy Programs between Small/Medium Community Health Centers and Large Community Health Centers.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Small and Medium CHC (n = 57)</th>
<th>Large CHC (n = 192)</th>
<th>Difference (Mean)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Assessment Composite</td>
<td>16.1</td>
<td>2.1</td>
<td>15.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Training (Yes)</td>
<td>Frequency (n)</td>
<td>Percentage</td>
<td>Frequency (n)</td>
<td>Percentage</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>32%</td>
<td>33</td>
<td>17%</td>
</tr>
<tr>
<td>Health Literacy Programs (Yes)</td>
<td>Frequency (n)</td>
<td>Percentage</td>
<td>Frequency (n)</td>
<td>Percentage</td>
</tr>
<tr>
<td>Formal Training</td>
<td>12</td>
<td>23%</td>
<td>23</td>
<td>12%</td>
</tr>
<tr>
<td>Education Material for LHL</td>
<td>31</td>
<td>56%</td>
<td>85</td>
<td>45%</td>
</tr>
<tr>
<td>Individual Education</td>
<td>15</td>
<td>28%</td>
<td>70</td>
<td>37%</td>
</tr>
<tr>
<td>Family or Friend</td>
<td>43</td>
<td>80%</td>
<td>127</td>
<td>68%</td>
</tr>
<tr>
<td>Dedicated LHL Specialist</td>
<td>2</td>
<td>4%</td>
<td>14</td>
<td>7%</td>
</tr>
<tr>
<td>Referral to Social Worker</td>
<td>34</td>
<td>62%</td>
<td>130</td>
<td>68%</td>
</tr>
<tr>
<td>Referral to Adult Education</td>
<td>10</td>
<td>19%</td>
<td>32</td>
<td>18%</td>
</tr>
</tbody>
</table>

*Note. CHC = Community Health Center; *p<0.05; Chi square tests were used to obtain these results.*
Table 4. Comparison of Health Assessment Health Literacy Training, and Health Literacy Programs between Rural Community Health Centers and Urban Community Health Centers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Rural CHC (n = 100)</th>
<th>Urban CHC (n = 142)</th>
<th>Difference (Mean)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Assessment Composite</td>
<td>16.0</td>
<td>2.2</td>
<td>15.4</td>
<td>2.2</td>
</tr>
<tr>
<td>Training (Yes)</td>
<td>21</td>
<td>22%</td>
<td>29</td>
<td>21%</td>
</tr>
<tr>
<td>Health Literacy Programs (Yes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formal Training</td>
<td>11</td>
<td>11%</td>
<td>23</td>
<td>17%</td>
</tr>
<tr>
<td>Education for LHL</td>
<td>41</td>
<td>41%</td>
<td>70</td>
<td>51%</td>
</tr>
<tr>
<td>Individual Education</td>
<td>39</td>
<td>39%</td>
<td>43</td>
<td>31%</td>
</tr>
<tr>
<td>Family or Friend</td>
<td>73</td>
<td>75%</td>
<td>92</td>
<td>67%</td>
</tr>
<tr>
<td>Dedicated LHL Specialist</td>
<td>3</td>
<td>3%</td>
<td>13</td>
<td>10%</td>
</tr>
<tr>
<td>Referral to Social Worker</td>
<td>60</td>
<td>60%</td>
<td>102</td>
<td>73%</td>
</tr>
<tr>
<td>Referral Adult Education</td>
<td>16</td>
<td>16%</td>
<td>25</td>
<td>19%</td>
</tr>
</tbody>
</table>

Note. CHC= Community Health Center,* p < 0.05, Chi-Square tests were used.
Table 5. Comparison of Average Percentage of Spanish Speaking Patients between CHCs with and without Health Literacy Training Programs Health Center:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Training and Programs (% Yes)</th>
<th>Training and Programs (% No)</th>
<th>Difference (Mean %)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Training</td>
<td>29%</td>
<td>33%</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>Health Literacy Programs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formal Training</td>
<td>26%</td>
<td>31%</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>Education for LHL</td>
<td>29%</td>
<td>31%</td>
<td>21%</td>
<td>28%</td>
</tr>
<tr>
<td>Individual Education</td>
<td>24%</td>
<td>30%</td>
<td>26%</td>
<td>31%</td>
</tr>
<tr>
<td>Family or Friend</td>
<td>22%</td>
<td>28%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>Dedicated LHL Specialist</td>
<td>40%</td>
<td>36%</td>
<td>24%</td>
<td>29%</td>
</tr>
<tr>
<td>Referral to Social Worker</td>
<td>29%</td>
<td>31%</td>
<td>21%</td>
<td>28%</td>
</tr>
<tr>
<td>Referral Adult Education</td>
<td>25%</td>
<td>28%</td>
<td>25%</td>
<td>30%</td>
</tr>
</tbody>
</table>

*Note CHC = Community * $p < 0.05$; Chi-square tests were used.
Table 6. Comparison of Number of Interventions between Small/Medium and Large CHC and Rural and Urban CHC.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Small and Medium CHC (n = 57)</th>
<th>Large CHC (n = 192)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Standard Deviation</td>
<td>Mean Standard Deviation</td>
<td></td>
</tr>
<tr>
<td># of Interventions</td>
<td>5.4 1.4</td>
<td>5.2 1.5</td>
<td>.224</td>
</tr>
<tr>
<td>Rural CHC (n = 100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of Interventions</td>
<td>5.3 1.5</td>
<td>5.1 1.4</td>
<td>.321</td>
</tr>
</tbody>
</table>

Note. CHC = Community Health Center; Independent t tests were used.
Table 7. Comparison of Average Percentage of Spanish Speaking Patients between CHCs that have implemented Health Literacy Training Programs and those that have not.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Interventions (Yes)</th>
<th>Interventions (No)</th>
<th>Difference (Mean)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Repeat Back</td>
<td>34%</td>
<td>32%</td>
<td>22%</td>
<td>29%</td>
</tr>
<tr>
<td>LHL Ed. Material</td>
<td>24%</td>
<td>29%</td>
<td>30%</td>
<td>32%</td>
</tr>
<tr>
<td>Referral to</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>26%</td>
<td>31%</td>
<td>26%</td>
<td>29%</td>
</tr>
<tr>
<td>Family or Friend</td>
<td>37%</td>
<td>33%</td>
<td>21%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Note. CHC = Community Health Center*p < 0.05; Independent t test were used to obtain results
Table 8. Overall Model Summary of Regression Analysis for CHC size, location, provider type and patient language with the number of health literacy interventions as criterion

<table>
<thead>
<tr>
<th>Criterion</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Interventions</td>
<td>0.300&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.090</td>
<td>0.060</td>
<td>1.44</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

<sup>Note.</sup> CHC= Community Health Center*<i>p</i> < 0.05
<sup>d.</sup> Predictors: (Constant), Provider Type, CHC Location, CHC Size, Programs Formal Training Individual Education, Low Health Literacy specialist, and % of Non-English Speaking
Table 9. Beta Coefficients and Significance Levels Associated with Individual Predictors in the Regression Equation.

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>5.326</td>
<td>0.250</td>
<td>21.274</td>
</tr>
<tr>
<td>CHC size (small/med)</td>
<td>-0.314</td>
<td>0.251</td>
<td>-0.86</td>
</tr>
<tr>
<td>Provider Type(RN)</td>
<td>-0.119</td>
<td>0.229</td>
<td>-0.035</td>
</tr>
<tr>
<td>CHC location (rural)</td>
<td>-0.037</td>
<td>0.226</td>
<td>-0.012</td>
</tr>
<tr>
<td>Training (yes)</td>
<td>-0.313</td>
<td>0.287</td>
<td>-0.073</td>
</tr>
<tr>
<td>Individual Ed.(yes)</td>
<td>0.686</td>
<td>0.212</td>
<td>0.219</td>
</tr>
<tr>
<td>Dedicated LHL(yes)</td>
<td>0.809</td>
<td>0.416</td>
<td>0.133</td>
</tr>
<tr>
<td>% of Non English Speaking Patients</td>
<td>-0.004</td>
<td>0.004</td>
<td>-0.074</td>
</tr>
</tbody>
</table>

Note. Criterion = # of Interventions; ** Tolerance > 1-R square indicates no multicollinearity; CHC = Community Health Center, LHL = Low Health Literacy, Ed. = Education *p < 0.05; Multiple Regression analysis were used to obtain the results.
References


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in rapid estimate of adult literacy in medicine (REALM) scores. *Family Medicine, 36*(8), 575-581.


http://www.jointcommission.org/assets/1/18/improving_health_literacy.pdf


Appendix A
Care Model

**CARE MODEL**

Community
- Resources and Policies
- Self-Management Support

Health System
- Health Care Organization
- Delivery System Design
- Decision Support
- Clinical Information Systems

Productive Interactions
- Informed, Activated Patient
- Prepared, Proactive Practice Team

Improved Outcomes
Appendix B
Decision Support Overlay

Health Care Organization: Community Health Center
- Geographical location
- Size
- Health care provider type
- Primary language of the patient

Decision Support
- Health Literacy Assessment
- Formal Training
- Health Literacy Programs

Productive Interactions
- Low Health Literacy Interventions

Improved Outcomes
Appendix C

Health Literacy Survey
Health Literacy Survey

For this survey, please think about the level of health literacy for the adult patients at your community health center.

Low health literacy is when individuals have difficulty obtaining, processing, and understanding basic health information and services needed to make appropriate health decisions.

While we realize that your health center likely cares for patients who speak many different languages, for the purpose of this survey, we would like you to refer only to your patients who speak English or Spanish fluently or as their first language.

Directions: Please fill in the circles completely with pencil or blue or black ink. Please print all letters and numbers clearly in the spaces provided.

If you are not eligible for this survey because you are not a community health center provider, or you treat only children, please check the appropriate box below and return this survey in the self-addressed stamped envelope and disregard the rest of the survey.

☐ I am not a community health center health care provider.
☐ I am a community health center provider, but I treat only children.

1) What do you estimate the prevalence of low health literacy to be for all English-speaking adult patients at your health center? (please indicate a percentage between 0 and 100%)

2) What do you estimate the prevalence of low health literacy to be for all Spanish-speaking adult patients at your health center? (please indicate a percentage between 0 and 100%)

For item #3, please mark the most accurate response based on your experience caring for your community health center patients with low health literacy who speak English. (fill in one response per row)

3) To what degree does low health literacy interfere with your English speaking patients' ability to:

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>A little</th>
<th>A moderate amount</th>
<th>Quite a bit</th>
<th>A great deal</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) understand basic health information?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b) obtain appropriate health services?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>c) follow through on recommended treatments?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

For item #4, please mark the most accurate response based on your experience caring for your community health center patients with low health literacy who speak Spanish. (fill in one response per row)

4) To what degree does low health literacy interfere with your Spanish speaking patients' ability to:

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>A little</th>
<th>A moderate amount</th>
<th>Quite a bit</th>
<th>A great deal</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) understand basic health information?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b) obtain appropriate health services?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>c) follow through on recommended treatments?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Below for administrative purposes only.

Date
DRTC Health Literacy CHC 2
Site #
U of C List #

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For item #5, please indicate how often you do each of the following to assess health literacy when you are personally caring for patients. (Fill in one response per row)

5) How often do you:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) ask a patient for the last grade they completed.</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) have a patient repeat instructions back to you.</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) ask a patient if they understand instructions or have any questions.</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) formally assess health literacy with a validated questionnaire.</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) use your &quot;gut feeling&quot; as a clinician to assess health literacy.</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6) Did you receive any formal training specific to dealing with patients with low health literacy?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

7) Please select the special methods or techniques you use to assist your patients who have low health literacy. (Fill in all that apply)

<table>
<thead>
<tr>
<th></th>
<th>Review instructions carefully with patient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Have patient repeat instructions back to you to check understanding</td>
</tr>
<tr>
<td></td>
<td>Describe medical conditions, treatments, and instructions in layman’s terms</td>
</tr>
<tr>
<td></td>
<td>Provide patient with health education materials (brochures, videos, etc.)</td>
</tr>
<tr>
<td></td>
<td>Provide patient with health education materials (brochures, videos, etc.) designed specifically for patients with low health literacy</td>
</tr>
<tr>
<td></td>
<td>Refer patient to other services available (i.e., social worker, adult literacy program)</td>
</tr>
<tr>
<td></td>
<td>Encourage patients to bring a friend or family member to appointments</td>
</tr>
<tr>
<td></td>
<td>Do not use any special methods or techniques</td>
</tr>
<tr>
<td></td>
<td>Am not aware of any specific methods or techniques</td>
</tr>
<tr>
<td></td>
<td>Other (please specify)</td>
</tr>
</tbody>
</table>

Page 2 of 6
8) Please indicate in the table below which type of low health literacy program(s) or intervention(s) your health center has instituted (if any), and how effective you believe the intervention has been.

<table>
<thead>
<tr>
<th>Program or Intervention</th>
<th>Did your health center institute ...?</th>
<th>How effective has this program been? (fill in one response per row)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Formal training in techniques to better assist patients with low health literacy</td>
<td>Yes</td>
<td>Not at all effective</td>
</tr>
<tr>
<td>b) Provided patients with health education materials designed especially for patients with low health literacy</td>
<td>Yes</td>
<td>Not at all effective</td>
</tr>
<tr>
<td>c) Intensive, individualized health education session(s) for patients with low health literacy</td>
<td>Yes</td>
<td>Not at all effective</td>
</tr>
<tr>
<td>d) Encouraged patients to bring a friend or family member to appointments</td>
<td>Yes</td>
<td>Not at all effective</td>
</tr>
<tr>
<td>e) Dedicated low health literacy specialist at the center</td>
<td>Yes</td>
<td>Not at all effective</td>
</tr>
<tr>
<td>f) Referred patients to social worker or other clinic personnel</td>
<td>Yes</td>
<td>Not at all effective</td>
</tr>
<tr>
<td>g) Referred patients to adult education center or other outside agency for help with language or reading</td>
<td>Yes</td>
<td>Not at all effective</td>
</tr>
<tr>
<td>h) Other (please specify)</td>
<td>Yes</td>
<td>Not at all effective</td>
</tr>
</tbody>
</table>

9) What interpreter services are available at your health center for your patients who speak only Spanish? (fill in all that apply)

- Professional interpreters available
- Bilingual staff available
- Patients must provide own interpreter or attend appointment without one
- Other (please specify)
10) Please indicate in the table below how helpful you believe each of these low health literacy programs or interventions would be at your health center.  (Fill in one response per row)

<table>
<thead>
<tr>
<th>Program or Intervention</th>
<th>Not at all helpful</th>
<th>Somewhat helpful</th>
<th>Helpful</th>
<th>Very helpful</th>
<th>Extremely helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Training providers formally in techniques to better assist patients with low health literacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Providing health education materials designed especially for patients with low health literacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Intensive, individualized health education session(s) for patients with low health literacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Encouraging patients to bring a friend or family member to appointments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Reminder cards, specifying key processes of care, which patients can give their provider at their next clinic visit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Referring patients to social worker or other clinic personnel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Referring patients to adult education center or other outside agency for help with language or reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Screening patients formally for low health literacy, and providing appropriate services based on that screening</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Other (please specify):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11) What barriers to implementing formal health literacy programs at your health center do you foresee occurring? (Fill in all that apply)

- Lack of knowledge about low health literacy among providers and other staff
- Health literacy may be considered a low priority as compared to other problems
- Senior leadership not supportive
- Belief that low health literacy is not a major problem at health center
- Belief that a screening or intervention program would not improve outcomes or otherwise make a difference for quality of patient care
- Good low health literacy programs are not readily available
- Too difficult to implement a low health literacy program among patients who use many different languages
- Too difficult to implement a culturally competent health literacy program
- Health center does not have the monetary resources to implement a program
- Health center providers do not have enough time to screen patients
- Health center providers do not have enough time to implement a health literacy program
- Other (please specify)
12) Is your health center in a rural or urban location? (fill in one)

- Rural
- Urban

13) What is your current position at the health center? (fill in all that apply)

- Certified Medical Assistant (CMA)
- Dietician
- Health Educator
- Licensed Practical Nurse (LPN)
- Physician
- Physician Assistant (PA)
- Registered Nurse (RN)
- Registered Nurse Clinician (RNC) / Clinical Nurse Specialist (CNS) / Nurse Practitioner (NP)
- Social Worker
- Administrator (please specify)
- Other (please specify)

14) Do you regularly see or deal with patients in your current position at the health center?

- Yes
- No

15) How many years have you been a practicing health care provider?

[ ] Years

16) What percentage of the patients you see are non-English speakers? (please indicate a percentage between 0 and 100%)

[ ] %

17) What age of patients do you normally see? (fill in one)

- Children (0-17 years)
- Adults (18+ years)
- All ages

18) What is your gender?

- Female
- Male

Page 5 of 6
19) Do you consider yourself to be Hispanic, Latino, or of Spanish Origin?

☐ Yes
☐ No

20) What race do you consider yourself to be? (fill in all that apply)

☐ American Indian or Alaska Native
☐ Asian
☐ Black or African American
☐ Native Hawaiian or Other Pacific Islander
☐ White
☐ Other (please specify):

21) In what year were you born? [ ] [ ] [ ]

22) Please add any more comments or suggestions you have regarding low health literacy in community health centers.

Thank you for taking the time to fill out this survey. Your answers will provide valuable insight into health literacy issues at community health centers. Please return the completed survey in the enclosed, self-addressed, stamped envelope to:

Jennifer Walk, Project Manager
University of Chicago
5841 South Maryland Avenue
Suite B200, M/C 2007
Chicago, IL 60637
Appendix D
Institutional Review Board Approval Letter

To: Cynthia Schaefer
From: James Phillips
Subject: Protocol #2014/09/13
Date: 10/09/2014

The protocol 2014/09/13. Low health literacy interventions and resources used at community health centers using Decision Support from the Care Model. has been verified by the Institutional Review Board as Exempt according to 45CFR46.101(b)(4): Existing Data & Specimens - No Identifiers on 10/09/2014.

The consent form, if applicable, is attached and stamped with IRB approval and approval date. Recruitment fliers, if applicable are also stamped and you can access these from your protocol page via Mentor. You should use the stamped forms as originals for copies that you distribute or display. If you propose any changes in your procedure or consent process, you must complete an amendment form of those changes and submit it to the IRB Chair for approval. Please wait for the approval before implementing any changes to the original protocol. In addition, if any unanticipated problems or adverse effects on subjects are discovered, you must immediately report them to the IRB Chair before proceeding with the study.

Because the study is exempt and there is no specific expiration date, you will not receive a continual renewal notification nor will you need to complete an annual report. However, when the study is complete, you must terminate the study by completing the Exempt Study Termination Form that can be found under IRB Documentation. Please upload the completed form to your protocol page via Mentor. Keep a copy of your research records, other than those you have agreed to destroy for confidentiality, over a period of five years after the study’s completion.

Please note that changes to your protocol may affect its exempt status. Please contact me directly to discuss any changes you may contemplate.

Thank you for contributing to Duquesne’s research endeavors,
James Phillips, Ph.D.
IRB
phillips@duq.edu