

Health Literacy and Media Preferences with Stroke Survivors

By

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Abstract

Limited health literacy skills have been determined in the general population, yet studies on specific populations impaired by disease are lacking. These are the populations who utilize the health care system the most; however, they are also understudied. Various educational topics are provided to these populations in different formats and when health literacy ability is lower than the education being provided, the clients' abilities to understand are affected. This can lead to noncompliance, increased hospitalizations and/or poor health choices. This study examined a convenient sample of 30 stroke survivors who attend a community based education program in the greater Kansas City area. To be included in the study, the participants had to have functional vision with all visual fields intact and score above the dementia impairment zone on the SLUMS. Exclusion criteria included demonstration of aphasia and non-English speaking. In examining this group, their health literacy abilities were assessed using a health literacy screen which utilizes six questions about a nutrition label as its measure. The participants were also asked about their educational media preference type. Demographic information was collected which included age, income, educational level and computer use time. Results showed significant findings with relationships of educational level, income and health literacy levels. The participants did not indicate any educational media preference. Also more than two-thirds of the sample was identified as being at risk for limited health literacy using the literacy screen. The significant findings of education and health literacy levels must be examined with caution as education has been determined to be a poor indicator of literacy ability due to education quality variance. Income is also indirectly linked with education and health literacy levels. However, clinically this sample was identified as an increased risk for limited health literacy skills. Ascertaining the correct level of education allows for understanding with the provision of

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education. It was also of note this sample would be accepting of education in any format as long as they were being provided with information which was relevant to them.

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Chapter One

Introduction

Research indicates many adults living in the U.S. do not have all the necessary literacy skills to successfully negotiate and participate in the current health care system (U.S. Department of Health and Human Services, 2000). However there is a strong focus on the promotion of this health care system where the client engages pro-actively in the roles of preventative self care and health maintenance. This focus was codified in Healthy People 2010, a set of 10-year national disease prevention and health promotion objectives developed by the U.S. Department of Health and Human Services (U.S Department of Health and Human Services, 2000). Healthy People has established and monitored progress on benchmarks for the past three decades, which now includes health literacy objectives. Healthy People 2020 continued this tradition of literacy objectives with the launch of its 10-year agenda in December 2010 (U.S Department of Health and Human Services, n.d.). In order to successfully participate in the health care system an individual must have a certain literacy level. Health literacy is a major health concern.

Engagement in the health care system is not possible for all people when they are unable to read and understand the health care education provided to them. When clients are not able to understand prescriptions, educational handouts or exercise regiments, proactive engagement becomes difficult (Nair & Cienkowski, 2010; Speros, 2004). Health literacy is a component within the health care system that is recognized as needing assessment in order for people to actively participate (Agre, Stieglitz & Milstein, 2006; Walker, Pepa & Gerard, 2010).

At the same time, health care providers supply education in various formats without regard to the client's level of understanding (Knight, Worrall & Rose, 2006). Client education is the most common treatment intervention in occupational therapy with 74% of therapists using it often or most of the time (McEneany, McKenna & Summerville, 2002). Sharry, McKenna and

Tooth (2002) determined verbal and written media is used extensively by occupational therapists. However much of the printed material is written at a tenth grade level or higher while the average American reads between a sixth and eighth grade level (Reed-Pierce & Cardinal, 1996). Low literacy is a serious issue for the older patient population (Weiss, Reed & Kligman, 1995) and minimal research has been performed with the health literacy levels of specific diagnoses. This is crucial because increased health risks exist in vulnerable populations who have low health literacy rates (Levy & Royne, 2009). Assessment of the health literacy levels of specific populations who have health related illnesses is important as it can guide the creation of educational materials that are appropriate and therefore positively impact the health of those populations.

In 2006, stroke caused the death of 137,199 people ; today there are approximately 6.4 million stroke survivors (“Stroke Statistics”, n.d.). Stroke survivors are a population set who utilize the health care system as approximately 30% of stroke survivors participate in some type of outpatient therapy after they are discharged from the hospital (Xie et al., 2007). This research will look at the health literacy levels and media preferences of stroke survivors who attend an outpatient community based education program.

A literature review demonstrates a scarcity of printed information is provided to stroke survivors (Hanger, Walker, Paterson, McBride & Sansbury, 1998; Wellwood, Dennis & Warlow, 1994), and this population wants information (Knight et al., 2006). Sullivan and O’Connor (2001) reported when educational materials are provided to stroke survivors, the reading level is too high for the clients to understand. The health literacy levels of specific clients needs to be addressed by rehabilitation professionals in order to ensure prescribed interventions improve the capacities, functioning, participation and self efficacy of clients (Levasseur & Carrier, 2010).

Knowing the health literacy levels of clients allows for better dissemination of information, thus creating a rehabilitation process which is more client-centered and effective.

Printed material is the most commonly used form of educational media (Bernier, 1993; McEneaney et al., 2002; Sharry et al., 2002). However, no research exists that examines what form of health educational media clients prefer if they have choices between video, printed materials or computer. One research paper reported clients prefer health care education that is provided verbally as opposed to written materials, suggesting the verbal information is more simplified than written (Knight et al., 2006). However, no research has examined what clients might prefer is given the choice between three popular media forms for health care education delivery.

This information indicated that the issues of health literacy and media choices must be directly addressed. Occupational therapists, because of their client-centered position within the health care system, are able to make positive contributions to the health literacy concerns; they can play a role in assessing and providing interventions that speak to this functional skill. Literacy is considered an activity of daily living (ADL), which is an area where occupational therapists assist clients as they work to maneuver successfully within the health care system. Occupational therapists can also play a vital role in examining how clients view the media choices.

Health Literacy Defined

Health literacy, which is not limited solely to the ability to read, encompasses an individual's capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (U.S. Department of Health and Human Services, 2000). Reading, counting, listening, comprehending, analyzing, and problem solving are all skills necessary to understand basic health information. The ability to critically analyze

information allows a client to participate fully and find a sense of ownership within each unique health care experience (Costa, 2003).

Reading Literacy Theory

One theory that is associated with the reading ability in health literacy is the Schema Theory. This theory posits how knowledge is created and in turn, how the reader or learner uses this knowledge (Tracey & Morrow, 2006). Every person has their own individualized schemas consisting of people, language, and places, as well as the skills and different ways to perform activities. Since schemas evolve from what a person experiences, new knowledge on a familiar topic will be learned more effectively. The new knowledge, in turn, expands literacy ability. This means schema plays a role in reading comprehension, making literature more understandable. Schemas are important in the building of operative reading skills that allow for understanding and inferential proficiency with written words (Paul & Verhulst, 2007).

Schemas can also change and expand (Tracey & Morrow, 2006). A child who knows about Thomas the Tank Engine and sees a real steam engine for the first time will adjust and add the new “steam engine” knowledge to his or her schema. The child will incorporate the size of the engine, the sounds from the train; in essence the “realness” of the train will be added to the child’s previous train schema. This concept can be applied to the provision of health information. Expanding a schema is relevant to the clinician who is educating the client about a diagnosis. Augmenting the schemas enables the client to learn new things about the diagnosis, which in turn enhances his or her literacy knowledge base. A printed handout of shoulder exercises for a broken arm may not make sense until the clinician educates the client about frozen shoulder syndrome.

Because the client is not stagnant within the learning process, his or her schemas will expand as long as the education is provided at a level which is familiar and relevant (Anderson,

1994; Carrell & Eisterhold, 1983; Paul & Verhulst, 2007). If the material is too hard to understand, the client will not be able to use the information which can lead to issues with compliance (Jukkala, Deupree, & Graham, 2009).

Understanding and familiarity, two of Schema Theory's postulates, may also influence a client's learning and educational media preference. For example, younger clients are more often familiar with computers and the internet than older clients (Tian & Robinson, 2008). Because of this, education provided on a health information website may be learned better by the younger population. A younger person is more likely to understand and know how to navigate around a website because of prior experience. Client education allows for knowledge acquisition, enables involvement with the treatment process and creates an atmosphere of accountability because the client was involved with the decision making (Miller & Shank, 1986). If the client education is presented in a manner that the client cannot comprehend and access easily, he or she will not be fully informed. This prevents the client from making the appropriate determinations as well as understanding what is necessary for treatment.

Occupational Therapy Defined

The American Occupational Therapy Association (AOTA) defines occupational therapy as "the therapeutic use of everyday life activities (occupations) with individuals or groups for the purpose of participation in roles and situations in home, school, workplace, community, and other settings. Occupational therapy services are provided for the purpose of promoting health and wellness and to those who have or are at risk for developing an illness, injury, disease, disorder, condition, impairment, disability, activity limitation, or participation restriction. Occupational therapy addresses the physical, cognitive, psychosocial, sensory, and other aspects of performance in a variety of contexts to support engagement in everyday life activities that affect health, well-being, and quality of life" (p.1). An occupational therapist can help a client

relearn basic ADLs such as how to dress him or herself, perform bathing or brushing teeth to more complex instrumental activities of daily living (IADLs) such as cooking and housecleaning. Occupational therapists evaluate, perform interventions and continually reassess their clients. There are many assessment and screening tools, standardized and non-standardized, available to therapists. These tools can be used to evaluate, to document progress, or to demonstrate a level of certain ability. Screening tools can be effective because they are generally quick to administer and provide the therapist with vital information about the client regarding possible interventions or the necessity for more detailed assessments (Schultz-Krohn & Pendleton, 2006).

Occupational therapists work in many different settings including hospitals, outpatient settings, home health and community living situations. Occupational therapists work with clients of any age and disability. They can work with someone who is newly injured, someone who was born with a developmental delay, or even those who with mental illness (Schwartz, 2006).

Stroke Defined

One common diagnosis occupational therapists work with is cerebrovascular accident (CVA) or as it is more commonly known, stroke. Throughout this text, the term “stroke” will be the preferred usage. A stroke occurs when brain cells die due to lack of oxygen from some type of blockage or rupture of an artery in the brain which causes impairment in the blood flow to that area (Gillen, 2006). The symptoms of a stroke can vary depending on what part of the brain was affected by the lack of oxygen. Symptoms can include weakness or paralysis of one side of the body with partial or complete loss of voluntary movement or sensation in a leg or arm. There may also be cognitive difficulties such as decreased memory, lack of insight and/or decreased problem solving ability. In addition, patients can have speech problems and weak facial muscles that can cause drooling.

Occupational therapists play a major role in helping clients who have suffered a stroke regain their independence. Occupational therapists assist with regaining motor, visual and cognitive function through interventions which can include muscle retraining, adaptive equipment education and sensory reeducation (Gillen, 2006). Part of the occupational therapy process involves providing printed material, which can include information about the diagnosis, home exercise programs, health promotion, and education about energy conservation and work simplification (Pendleton & Schultz-Krohn, 2006). Being able to read and understand the handouts means the clients must have an adequate level of health literacy. If a client's literacy level is affected, the educational materials need to be provided at an understandable level.

Types of literacy assessments

There are several tests available to evaluate the literacy level of a client in the health care setting. These include the Rapid Estimate of Adult Literacy in Medicine (REALM), Wide Range Achievement Test 1993 (WRAT 3), the Medical Terminology Achievement – Reading Test (MART), the Cloze Test, the Test of Functional Health Literacy in Adults (TOFHLA) and the Newest Vital Sign (NVS). Particular scores on these tests help to determine the literacy levels of the participants.

The Rapid Estimate of Adult Literacy in Medicine (REALM) is one of the more frequently utilized tests with sixty-six progressively difficult preselected words read from a list (Cutilli, 2005). The test takes two to three minutes to administer so it is a quick assessment. On the negative side it does not distinguish above a ninth grade reading level, so if a client has a higher literacy level, the test will not be able to accurately assess that individual's literacy ability. Also understanding and knowing the definitions of words is not required, only the ability to verbalize the words, which limits the practical application of the assessment. As noted previously in the definition, health literacy is not only the ability to read. The constructs of obtaining, processing

and understanding health information are also part of the definition. An individual who can read the words yet not understand them will more than likely demonstrate difficulties following medication instructions, comprehending discharge information and reading educational materials (Ozdemir, Alper, Uncu, & Bilgel, 2010).

The Wide Range Achievement Test 1993 has a reading portion similar to the REALM (Cutilli, 2005). The WRAT incorporates reading, spelling and arithmetic for ages ranging from five to seventy-four. This assessment is short (three to five minutes) and can be adapted to the taker's needs. This assessment does not assess health literacy, only general literacy.

The Medical Terminology Achievement – Reading Test (MART) uses a prescription bottle (Cutilli, 2005). It takes approximately three to five minutes to administer. The test combines the details found on a label with a word list similar to that of a WRAT 3 or REALM.

The REALM, WRAT and MART all assess word recognition (Cutilli, 2005). This is known as decoding meaning it determines how well a person can read a word but does not guarantee a person understands the word.

The Cloze Test requires the individual to fill in blanks using words from up to four choices per question (Cutilli, 2005). The correct form of the word must be chosen requiring more than a general recognition of words and/or terms. A sixth grade or above reading level is required, thus limiting the use of this test to specific clients. It also takes two hours to develop because the administrator has to prepare a reading passage, and administration of the test takes ten to twenty minutes. This makes it time consuming for use in a health care setting.

The Test of Functional Health Literacy in Adults (TOFHLA) checks reading comprehension and numeric ability (Baker, Williams, Parker & Gazmararian, 1999). The passages discuss materials commonly found in a hospital or clinic and medical information encountered in an outpatient setting. This test is available in a shortened version as well as in Spanish. This test

has good reliability and is a valid measure of clients' ability to read materials (Nurss, Parker, Williams & Baker, 2001). The shortened version takes approximately seven minutes to administer. An unpublished study by Brendal, Lee, Obermeyer, Sanderman and Wiskur in 2009 demonstrated stroke survivors who took the shortened version of the TOFHLA were perplexed by the scenarios and unable to answer the questions in a timely manner due to their confusion.

The Newest Vital Sign (NVS) is a nutritional label that is accompanied by six questions and takes approximately three minutes to administer (Weiss et al., 2005). However, it is not a timed tool. Clients who score >4 on the NVS have adequate literacy while a score <4 indicates the possibility of limited literacy. A score <2 means the client has a 50% chance of having marginal or inadequate literacy. This score would indicate to the examiner that there are literacy issues. When compared with the TOFHLA, the NVS provides a better discrimination of the skill level of test taker in the upper part of the distribution of literacy skills. The short administration time as well as the familiarity of a nutrition label makes the NVS the more appropriate screening tool to use when assessing the literacy levels of stroke survivors.

According to Schema Theory, assessment to determine a client's literacy level would require the use of a test that utilizes familiar items since experience plays a part in literacy ability (Anderson, 1994). Familiar items in a schema help organize thinking when learning or assessing information, and this organization allows for more active participation (Kissner, 2009; Richgels, 1982). The use of a nutritional label is a schema common to the majority of people making it a better choice to assess health literacy (Baker, 2006). Confusion about the tool would not impact the results of the assessment as the TOFHLA did (Brendal et al., 2009).

Using this screening tool means a client's literacy level can be established by the occupational therapist, and materials can then be created at the correct literacy level of the client. Proper and appropriate education can assist the clients and caregivers as they try to comprehend

the ramifications of a stroke, understand what is happening currently, what to expect in the future, and how to reduce the risk of future strokes (Hoffman & McKenna, 2005).

Types of Media Education

Different types of media can be utilized to educate people who have experienced a stroke. They include videos, printed materials, and use of computers. Videos are used to educate clients about health care issues including interventions and outcomes of procedures (Klein-Fedyshin, Burda, Epstein & Lawrence, 2005). Videos provide a single mode of media in the form of auditory information which is like the education provided by the health care provider when he or she meets with clients.

Handouts with pictorial representation are considered multimedia. Richard Mayer (2005) defines multimedia as “presenting words (such as printed text or spoken text) and pictures (such as illustrations, photos, animation, or video)” (pg 2). Multimedia learning occurs when mental representations are built from words and pictures (Mayer, 2005). The majority of occupational therapists use printed materials for ease as well as providing clients with something that can be taken home and read or reread at the client’s own pace (Bernier, 1993; Griffin, McKenna & Tooth, 2003; Griffin, McKenna & Tooth, 2006). The multimedia principle states better learning and understanding occurs when written text is presented with pictures as opposed to text only (Fletcher & Tobias, 2005). Learning and retention of the education is further enhanced when the material is relevant to the reader.

Another form of multimedia with increased use is computers. The modality effect supports this form of media; it says information is presented in partly auditory and visual modes (Low & Sweller, 2005). This media needs more investigation but preliminary results indicate better learning occurs when a person is presented with graphics and narration as found with

computers as opposed to graphics and printed text, which is generally the format found in pamphlets and other printed materials.

Specific Aims of Study

According to Healthy People 2010 (U.S Department of Health and Human Services, 2000) and Healthy People 2020 (U.S Department of Health and Human Services, n.d.) health literacy has been identified as a critical issue. No data has been collected on health literacy levels of the stroke population. It is important to collect data on the health literacy levels of different populations in order to determine if certain populations are at an increased risk for low literacy. Occupational therapists mainly use printed materials to inform their clients about interventions, exercise programs, education about disease and/or wellness and prevention (McEneaney et al., 2002); however, they may be providing education the clients cannot use. At the same time, an assessment of media preferences may indicate if education should be provided in different and preferred formats.

Purpose of Study

The purpose of this study is to describe and compare the health literacy levels of stroke survivors and media preferences with the effects of age, socioeconomic and educational background, and length of time since the stroke occurred. This researcher sought to address the issue of assessing health literacy levels when providing educational media to stroke survivors.

Research Questions

This researcher sought to answer the following research questions:

1. What are the health literacy rates among stroke survivors?
2. Is written, video or computer educational media preferred by stroke survivors?

3. Does a relationship exist between health literacy levels of stroke survivors and media preference?
4. Does a relationship exist between health literacy levels of stroke survivors and the factors of age, SES, educational background, or time since stroke occurred?
5. Does a relationship exist between amount of computer use time and media preference with stroke survivors?
6. Does a relationship exist between media preferences and factors of age, SES, educational background, or time since stroke occurred?

Chapter Two

Literature Review

The review of the literature is presented in four sections. The first section summarizes the literature on health literacy in the United States. The second section reviews different variables to consider when looking at health literacy and their implications. The third section describes the different types of educational media focusing on printed materials, video, and computer. The fourth section summarizes the stroke population and the role of occupational therapy.

Health Literacy in the United States

In 2005, a study from the Institute of Medicine found 48% of the United States adult population was not able to make appropriate decisions about their health because they lacked the necessary literacy skills required to obtain, comprehend and analyze basic health information (Wolf, Gazmararian & Baker, 2005). In 2003, approximately 19,000 adults participated in the first national assessment of health literacy that was part of the National Assessment of Adult Literacy (NAAL) (U.S. Department of Education, National Center for Education Statistics, 2007). This assessment found 55% of the adults fell within the intermediate literacy range which meant they possessed the skills necessary to play an interactive role in the health care system. However, 14% of the adults had below basic health literacy, meaning an inability to function effectively in everyday situations. At this level, people may have trouble reading appointment slips, understanding directions on medication bottles, or comprehending consent paperwork. By analyzing the ability of adults to complete health specific tasks representing daily real life situations, the 2003 study provided the first real measure of health literacy within the domains of clinical interaction, prevention and navigation of the health system.

Individuals with low health literacy skills come from a variety of backgrounds; however, below basic levels are almost twice as likely within the elderly. A 2005 cross-sectional study of 2,923 Medicare managed care enrollees found an association between inadequate health literacy and poor mental and physical health (Wolf et al., 2005). Based on findings of the 2003 NAAL, 27% of Medicare enrollees fell within the below basic health literacy level (U.S. Department of Education, National Center for Education Statistics, 2007). The NAAL study also found disproportionately high numbers of low health literacy among more than half of African Americans, adults without insurance coverage and low income adults.

A 2007 study that looked at adult literacy levels in different health arenas found minority populations, immigrants, and adults who lacked a General Educational Development Certificate (GED) had a significantly lower proficiency in health related literacy (Rudd, 2007). The 2003 NAAL findings revealed a positive correlation between years in school and higher literacy levels. The NAAL also found the average American adult reads at an eighth grade level, while the average Medicare recipient reads at a fifth grade level (U.S. Department of Education, National Center for Education Statistics, 2007).

At the same time, people are increasingly using the Internet as a resource for medical information. However, most medical information available on Internet is generally written at the twelfth grade level, which is much higher than the estimated reading level of the majority of U.S. citizens (Wilson, 2003).

Inadequate health literacy can be a barrier when educating clients who have been diagnosed with a chronic disease. Hourston (2004) determined clients with brain injuries did not know how to access health information, and if they did get information, it was too clinical for them to understand. Additionally, people with developmental disabilities reported dissatisfaction with the education provided. Health literacy was found to be a challenge for clients diagnosed

with cancer (Manning & Dickens, 2006). One in five of the clients were unable to understand basic information involved with cancer care. Another study of clients with diabetes and hypertension observed a positive relationship between low functional health literacy and lack of knowledge about the signs, symptoms and management of these diseases (Williams, Baker, Parker & Nurss, 1998). Drainoni et al. (2008) found 28% of clients diagnosed with HIV demonstrated inadequate or marginal health literacy.

Low health literacy rates have implications for lifestyle participation. Higher smoking rates, less routine pediatric care, and a lower likelihood to breastfeed are linked to low health literacy (Costa, 2003). Delayed diagnoses have been associated with low literacy (Wolf et al., 2006). Poor health care compliance and increased or unnecessary hospitalizations have been estimated to account for an extra \$30-37 billion on the annual health care bill (Wilson, 2003).

The relationship between literacy and health is clear: an individual's health status is predicted more strongly by literacy levels than age, income, ethnic or racial group, employment status, and education level (Wilson, 2003). Not only did individuals lacking competence in health literacy have worse overall health, but they were also more likely to report difficulty in activities of daily living, instrumental activities of daily living, and demonstrate lower leisure activity levels (Wolf et al., 2005).

Low literacy is not always evident, which can result in clients being supplied with health materials they do not understand (Dolon et al., 2004). Gannon and Hildebrandt (2002) found health care participants are marginalized both by limited literacy and health care providers who do not adapt their educational materials to coincide with the literacy levels of their clients. Well designed health communication activities can help individuals better understand their own needs, thus allowing them to take appropriate action to maximize their health. Safeer and Keenan (2005) found that poor compliance to treatment, more chronic diseases, and rising health care

costs were partially due to inadequate health literacy. Non-compliance to treatment interventions due to low health literacy proficiency has been documented in other studies (Jukkala et al., 2009).

Recognizing limited literacy is an important step, but another part of the process is to assess the literacy level of the health care population (Kendig, 2006). A study conducted by Levasseur and Carrier (2010) found rehabilitation professionals need to consider the health literacy levels of their clients. Successful rehabilitation of clients was linked to appropriate health literacy because it gave the clients the ability to negotiate within the health care system. Up until 2002, studies did not exist that looked at the use of written materials in occupational therapy (Sharry et al., 2002). Currently there are only a limited amount of studies looking at occupational therapy educational materials even though they are commonly used (Bernier, 1993). The Canadian Association of Occupational Therapists (CAOT) stated in their 2006 position paper, “The ability to understand, interpret and apply written and oral information is necessary for clients to accomplish daily living tasks, and maintain their independence and self-esteem” (p. 1).

Even though health care professionals recognize low health literacy may influence compliance, medication misuse, and decreased safety awareness, they are not always aware of their clients’ reading abilities. Due to their own level of education, health care professionals erroneously believe they possess the skills to assess poor literacy (Griffin et al., 2003). Students are taught to assume the general public has a sixth grade reading level, yet research shows 48% of materials developed by occupational therapists were written at or above a ninth grade reading level (Griffin et al., 2006).

Another component of health literacy is that individuals with low health literacy may feel ashamed and inferior and therefore are not comfortable asking their health provider for

assistance or to repeat pertinent information they did not understand (Safeer & Keenan, 2005).

In order to solve this problem, it is imperative all health professionals “become better client educators by understanding their clients’ literacy skills and identify[ing] techniques that enable improved communication of information” (Griffin et al., 2006, p.72). To accomplish this, educational materials should be created to fit the target client group after determining the general literacy skills of that group. Griffin et al. (2003) states “Occupational therapists should become critical consumers of written materials by regularly reviewing their content and appraising their design features to ensure their effectiveness and quality” (p.174).

The Queensland Study completed in Australia in 2005 used the REALM and the Simple Measure of Gobbledygook (SMOG), a reading level assessment, to illustrate that stroke patients’ and caregivers’ needs are not being met (Hoffman & McKenna, 2005). The purpose of this study was to evaluate stroke survivors and caregivers’ reading ability and the characteristics of written materials provided to them. This population wants printed materials, but it is provided with inadequate handouts. Almost all materials provided to stroke survivors are written at a level too advanced to be comprehended (Hoffman & McKenna, 2005; Hoffman, McKenna, Worrall & Read, 2004). The mean reading level of materials in the University of Queensland study was an eleventh grade level; however, the clients in this study read at a mean level equivalent to a seventh or eighth grade level. The caregivers read at a ninth grade or higher level. A person’s reading level is generally two to four years below the last grade completed (Hoffman & McKenna, 2005). Average adult reading level in the United States is an eighth grade level and people below a fifth grade level of literacy are considered to be functionally illiterate (Aldridge, 2004).

People with limited health literacy skills have the same health related issues as people with strong health literacy skills (Rudd, 2007). They need to maintain a healthy lifestyle, have a

safe workplace, eat a healthy diet, and be caregivers to their families. They have to negotiate the same health care system, be able to understand instructions from physicians, and know how to follow prescription details as well as understand effects of the medications they are taking. Kripalani et al. (2006) found adults with low literacy were not able to manage their medications, which included a decreased ability to identify the medications. The researchers felt this was linked with the larger issue of non compliance with medication adherence. The inability to manage the medications was due to low literacy. Medication management is a common health related link amongst all populations.

The health literacy screening tool used in this study was the Newest Vital Sign (NVS). When comparing the NVS with the REALM and the short version of the TOFHLA, the NVS had a high sensitivity to detecting limited literacy (Osborn et al., 2007). This study also suggested the NVS would be a useful clinical screening tool. Having a tool that does not take a lot of time to use when assessing health literacy ability increases the likelihood that occupational therapists would utilize it.

Factors and Implications for Health Literacy

Determinants that may influence health literacy include years of education, age, socioeconomic status, and time since stroke occurred. Paasche-Orlow and Wolf (2007) derived a conceptual causal model that linked health literacy to health outcomes. The researchers identified educational level, age, and socioeconomic status as three of the direct paths which influence health literacy. Many studies have connected lower health literacy scores with populations who have less education (Jolly, Scott, Feied, & Sanford, 1993; Kutner, Greenberg, Yin, & Paulsen, 2006; Miller, McCardle & Hernandez, 2010; Morrow et al., 2006; Paasche-Orlow, Parker, Gazmararian, Neilsen-Bohlman, & Rudd, 2005; Rudd, 2007; Shea et al., 2004; Zahnd, Scaife, & Francis, 2009). In all the studies, people with less education were defined as

those who did not graduate from high school and/or earn their GED. Fang, Pangulari, Machtinger and Schillinger (2009) reported that individuals with increased risk for stroke and low educational levels also demonstrated the lowest health literacy levels for stroke related education.

Education may advance literacy by promoting reading that increases experiences with text and helps develop strategies to enable successful comprehension and inference of written words (Stanovich, West, & Harrison, 1995). Schema Theory theorizes learning comes from expanding schemas that are already known, and the increased experiences of text and the automaticity of word recognition allow situational understanding to be developed. Therefore, literacy becomes more than reading the words; it allows for inferences and comprehending to occur.

However, number of years of education does not fully explain differences in health literacy (Andrus & Roth, 2002; Baker et al., 1999; Gazmararian et al., 1999; Sentell & Halpin, 2006; Williams et al., 1995). Within health research, education is typically measured by number of years completed, but this does not necessarily equate to the same accumulation of skills or knowledge (Baker, Gazmararian, Sudano, & Patterson, 2000). Thus, the educational variable in the traditional sense may not be a true representation of education. Quality of education, access to educational institutions, and life experiences may be the real determinants of level of education (Baker et al., 2000; Kirsch, Jungeblut, Jenkins & Kolstad, 2002; Stanovich et al., 1995; Williams et al., 1995).

Another variable that influences health literacy is age. Inadequate or marginal health literacy is more prevalent in the elderly populations (Gazmararian et al., 1999; Shea et al., 2004; Williams et al., 1993; Williams, Davis, Parker, & Weiss, 2002). The proportion of inadequate health literacy increases beyond the age of 65 years, suggesting reading ability decreases with

age. The National Adult Literacy Survey found those older than 54 experienced a rapid decline in literacy abilities (Kirsch et al., 2002)

This loss of literacy skills may be explained by factors of aging. As individuals age, they are more likely to develop illnesses associated with dementia that can affect reading ability (Gazmararian et al., 1999). The use of a standardized cognitive measure such as the Mini-Mental State Examination (MMSE) or the St Louis Mental Status Examination (SLUMS) can reduce the impact of age related declines in literacy (Baker et al., 2000).

The time allowed to complete health literacy assessments will negatively impact the health literacy score if an older person is unable to complete the assessment within the allotted time (Gazmararian et al., 1999; Morrow et al., 2006). Processing speed is the ability to access and efficiently integrate word meanings for comprehension. An adult who demonstrates reduced processing speed may not be able to complete a timed assessment because he or she requires more time to understand the text. The impact of aging affects processing time (Morrow et al., 2006). Thus, decreased processing speed can become a reality for the elderly and in turn negatively affect health literacy scores on timed assessments.

The elderly are more at risk for chronic health related illnesses and more likely to seek out health care services (Williams et al., 1995). Their increased risk for poor health literacy proficiency puts them in the dangerous position of more hospitalizations and adverse drug reactions due to limited understanding prescription instructions. This can lead to mismanagement of medications, including both taking too much of a particular prescription or not enough.

A well- researched inverse relationship exists between socioeconomic status and morbidity and mortality (Guralnik, Land, Blazer, Fillenbaum & Branch, 1993; Mookadam & Arthur, 2004; Pappas, Queen, Hadden & Fisher, 1993). Lower socioeconomic status equates to

unhealthy lifestyle choices (i.e., stressful living and work environments, less than optimal support systems, poor health, and lifestyle decisions) that ultimately lead to early death. A complex causal relationship links health literacy and socioeconomic status through morbidity and mortality. Poor knowledge about disease processes (Albert, Trochelman, Meyer, & Nutter, 2009; Schillinger et al., 2002), decreased access to the health care system (Pappas et al., 1993), and increased risky behaviors (Lindau, Basu, & Leitsch, 2006; Mookadam & Arthur, 2004; Wong, Shapiro, Boscardin, & Ettner, 2002) are all linked to the confounding factor of health literacy proficiency (Mookadam & Arthur, 2004; Sudore et al., 2006). Low health literacy appears to be a mediator for poor understanding of health and health related activities.

Wolf, Feinglass, Thompson and Baker (2010) reported health literacy was a determinant for an individual's lifelong socioeconomic status level. The researchers linked poor literacy proficiency to a lack of quality education, and this leads to a decreased earning potential and less than desirable job situation equating to a poor living situation.

When looking at health literacy, consideration must be paid to the fact it is not static (Paasche-Orlow & Wolf, 2007). Health literacy can improve from specific health care skills education or decline with age (Gazmararian et al., 1999; Morrow et al., 2006; Weiss, Francis, Senf, Heist, & Hargraves, 2006). Some specific neurological diagnoses, such as stroke, experience neuroplasticity. This is the brain's ability to make neurological improvements and reorganize itself at many different levels from cellular to cortical after injury (Johansson, 2011). The classic model of neurological improvement has been recovery plateaus between three and six months (Jorgensen, Nakayama, Raaschou, & Olsen, 1995; Wolpaw & Carp, 2006). Current research is challenging this thinking as new interventions and approaches are being investigated (Forrester, Wheaton & Luft, 2008; Johansson, 2011; Wolpaw & Carp, 2006). This type of research is in the initial stages, but if research shows the brain can continue to make neurological

improvements long after its injury, health literacy may be an area that can be affected and improved regardless of when the stroke occurred.

Educational Media

There are many different educational media choices, including printed materials, videos and computers. Bernier (1993) found clients prefer to be given health information through written materials, and printed materials are the most common instructional tool used by health professionals. Sharry et al. (2002) found 92% of the OTs declared the main reason for their use of written materials was to help clients remember verbal information. In the same study, 48% of the OTs used written materials because they had limited time to educate clients verbally. Clients can refer to written materials on their own time and at their own pace, providing flexibility to their education process (Griffin et al., 2003; Griffin et al., 2006). Other benefits include a consistent message, reusable, portable, and encourage self learning by the recipient (Hoffman et al., 2005; Hoffman, McKenna, Worrall & Read, 2007). However, written information can only be useful if the individual possesses the ability to read and understand the material.

For any health professional, client education involves delivering appropriate information in a format that best suits their clients' needs, and written materials have been the preferred and most commonly used method (Bernier, 1993; Sharry et al., 2002). However, videos and computers are two other education media methods. Gagliano reviewed studies about the efficacy of videos and found this format reduced client anxiety and pain (as cited in Klein-Fedyshin et al., 2005, p. 444). The clients also demonstrated better short term knowledge and coping. In the same paper, Klein-Fedyshin et al. (2005) used a video to address the educational needs of coronary clients once they were discharged to home. The video included information about expected problems once home, and the researchers concluded the clients experienced decreased anxiety and depression episodes as well as increased knowledge and compliance with

postoperative issues. Kinnane, Stuart, Thompson, Evans and Schneider-Kolsky (2008) found including a video into standard chemotherapy education improved how much information the clients were able to remember and helped them to better deal with treatment side effects.

Murphy, Chesson, Walker, Arnold and Chesson (2000) concluded that when considering health literacy levels and use of videos and pamphlets, both high and low literacy clients want printed materials and videotapes that explain medical treatment in an easy to understand format. High literacy clients were able to understand and follow more of both video and printed media than the low literacy patients, yet the high literacy clients still wanted simplified media.

In another study, Meade, McKinney and Barnas (1994) found the use of videotapes and personalized printed materials equally enhanced the ability of clients with colon cancer to learn about the diagnosis. They hypothesized there was no difference in the amount of education each media tool provided because the reading materials were presented at a reading level that met the literacy ability of the clients. Therefore, both tools were equally effective.

The use of video for health care education is a better media tool than printed materials for those who are in the low literacy category if the reading materials are not at the literacy level of the client (Kinnane et al., 2008; Murphy et al., 2000; Volandes et al., 2007). Clients are able to learn more about diagnoses, treatment interventions, and outcomes with videotapes as they bypass the low literacy issue by taking away the readability problem. However, there are studies that have found clients prefer printed materials over audiovisual materials (Hiromoto & Dungan, 1991; Melone, Anderson-Dreves, Jassak, Quirch & Melone, 1991). It was hypothesized that clients prefer educational materials they can take and view at home. Basically, it provides clients with the opportunity to control information and the amount they have to learn at a pace that is comfortable for each participant. This hypothesis has been also been supported in other studies (Griffin et al., 2003; Griffin et al., 2006).

Computer use is a popular media form for clients to utilize with health care education, but printed materials are more commonly used even if the clients have internet access at home (Basch, Thaler, Shi, Yakren & Schrag, 2004). Age may play a factor in the popularity of computers. Younger clients are more likely to seek health information from the internet than older clients (Tian & Robinson, 2008). Younger clients are also more likely to use the internet and printed materials in a complementary manner than older clients. Older clients tend to utilize the more traditional method of health care media, which are printed materials. Other populations who have been found to use the internet less are rural (Zahnd et al., 2009) and those with less than twelve years of education (Licciardone, Smith-Barbaro & Coleridge, 2001).

Research has identified that there is increased health knowledge with computer based programs for low literacy populations as long as the program is at the appropriate level for the user (Zyskind, Jones, Pomerantz & Barker, 2009). The more tailored the information is for the client who seeks health information on the computer, the more satisfied the client is about the information (Hoffman et al., 2007). This study also reported that clients' informational needs were more effectively addressed with the tailored programs. Studies about computers and health information usage are limited partially due to the newness of the media; currently, there is no research about client media preferences and health care education.

When looking at computer education versus one-on-one personal counseling, it has been found both are equally effective as long as the computer program is easy to access (Miller, Kimberly, Case & Wofford, 2005). The education provided and learned was not limited by the use of the computer program, which could be a more cost effective way to provide health care information. Again, this type of education must be tailored to the ability of the client in order to be effective.

Stroke Population and Occupational Therapy

Occupational therapists work with a variety of populations including stroke survivors. Individuals diagnosed with a stroke often experience long term consequences of physical, cognitive and/or visual problems coupled with an increased risk of reoccurrence. Managing a stroke and helping an individual return to a prior level of functioning requires the active participation of the stroke survivor, which can only occur if he or she is well informed (Hoffman et al., 2007). For this reason, it is essential that education is a component of post-stroke management, but it is widely acknowledged the education provided to stroke survivors is inadequate (Hoffman & McKenna, 2005). Evidence suggests many stroke survivors continue to express a lack of understanding about a stroke, causes, and ways to prevent future strokes from occurring. Although a gold standard method for conveying this type of information has not yet been established, written materials tend to play an important role in the process of educating individuals who have had a stroke (Hoffman & McKenna, 2005).

At the same time, lower health literacy levels tend to occur in older populations (Wolf et al., 2005; U.S. Department of Education, National Center for Education Statistics, 2007). Because most individuals of the stroke population are older, this means they are already at an increased risk. This may be further complicated by stroke related disabilities, such as aphasia and visual deterioration, which can also impact the client's reading ability.

Aphasia is a language impairment that can affect a person's ability to read and write as well as accurately express him or herself (Knight et al., 2006). These skills are necessary for people to participate effectively within the health care system, enabling a person to request and receive health information necessary to maintain or improve his or her health. They can also understand what is required of them and educate themselves about strokes. An individual with

aphasia may not be able to effectively understand written materials provided thus impairing his or her ability to negotiate within the health care system (Gillen, 2006).

Aphasia can also impair an individual's ability to verbally respond appropriately. Expressive aphasia, also known as Broca's aphasia, means the spoken word of the person may not be accurate even though cognitively the person is intact (Gillen, 2006). With this type of aphasia, reading comprehension and writing may also be severely impacted.

Receptive aphasia, also known as Wernicke's aphasia, means the person can put words together accurately but does not understand what people tell him or her (Gillen, 2006). Again, reading and writing comprehension may be limited. Anomic aphasia is when a person has word finding problems, and this form of aphasia can cause mild to severe deficits in reading comprehension. A person who has any of the above types of aphasia may not be able to reliably represent his or her abilities where health literacy is involved.

Visual impairments are another possible side effect of a stroke, and they can come in various forms. There are different types of visual field cuts where a person may see only one part of the visual field (Warren, 2006). This means when a person with a visual field cut looks at a printed page, he or she cannot see the whole page.

Problems with visual scanning occur when the client's eyes do not track smoothly (Warren, 2006). The person with this type of deficit cannot follow a line of words on a page without losing track of his or her place because the eyes do not move smoothly. Problems with double vision would mean words in educational materials cannot be seen clearly (Warren, 2006). These types of impairments do not mean the person is cognitively unable to read or understand written literature; instead, it means the person cannot physically see the words due to the impact of the stroke on the visual centers of the brain. Therefore, evaluations that require reading may not be an effective assessment of the ability of a person who has visual issues from a stroke.

Currently no research documents health literacy and neurological visual disorders such as double vision or hemianopsia, and only limited research exists that examines health literacy and visual impairments. Harrison, Mackert and Watkins (2010) theorized literacy is more demanding for someone who has a visual impairment. A sighted person constantly receives visual stimuli to reinforce visual printed materials while someone who has a visual impairment has limited sensory input that can lead to misunderstanding with the health message.

Summary

There is a large amount of literature describing health literacy and the importance of knowing health literacy proficiency (Costa, 2003; Wilson, 2003; Wolf et al., 2006). From the literature, it appears health care professionals, including occupational therapists overestimate reading ability (Gannon & Hildebrandt, 2002; Griffin et al., 2003; Levasseur & Carrier, 2010). At the same time, the clients are too embarrassed to let the health care professional know they do not understand the material (Safer & Keenan, 2005; Jukkala et al., 2009; Kripalani et al., 2006). This can lead to noncompliance from the client that is not malicious or deliberate: the client simply does not know what to do.

Occupational therapists rely on printed materials to serve as a complement to therapy services (Bernier, 1993). Yet therapists are providing reading material the client cannot utilize because the reading level is too high to meet the client's needs (Griffin et al., 2006). Health literacy proficiency of clients must be an important consideration for health care professionals. In order for clients to be educated about disease processes, including treatment and interventions, they must be able to understand the materials. The utilization of a health literacy screening tool prior to the initiation of therapy to assess aptitude can ensure comprehensible education is provided.

However, there is a paucity of research that examines particular diagnoses and health literacy proficiency. This study used the Newest Vital Sign to screen the health literacy abilities of stroke survivors who attend programs at the Stroke Foundation and their scores were documented. Because of the varied neurological effects of aphasia, cognition and visual difficulties that can directly influence accuracy of responses (Knight et al., 2006; Warren, 2006), not all attendees at the Stroke Foundation were eligible.

Variables exist that are believed to affect health literacy, but conclusive evidence regarding the educational level of the client continues to be elusive and contradictory (Miller et al, 2010; Morrow et al., 2006; Baker et al., 2000). More conclusive variables are age and socioeconomic status. This study collected and examined demographic information on years of education, age, and socioeconomic status of the participants. Relationships between health literacy and listed variables as well as time since stroke occurred were also analyzed.

The provision of education is an integral part of health literacy that also needs to be scrutinized. There is a trend to utilize printed media when educating clients (Bernier, 1993) but the use of video and computers are increasingly being examined for effectiveness in delivery of education (Griffin et al., 2006; Kinnane et al., 2008; Murphy et al., 2000; Volandes et al., 2007). There is no consensus whether one format is more preferable than others, and currently there does not appear to be any literature that examines media preferences of stroke survivors.

While there are many different facets of health literacy that are in need of research, this study aimed to examine the health literacy abilities of a specific diagnosis, stroke survivors, and determine if they have an educational media preference. At the same time, the confounders of age, education, socioeconomic status, and time since the stroke occurred were examined to investigate their impact on health literacy ability. These results may be useful for practitioners who are trying to determine whether to assess health literacy. Results from this study may also

assist in determining if there are indicators for particular levels of educational material in certain formats with specific health literacy scores to enhance the learning opportunities of clients.

Chapter Three

Methodology

The purpose of this study was to describe and compare the health literacy levels of stroke survivors and media preferences with the effects of age, socioeconomic and educational background, and length of time since the stroke occurred. The first research question assessed the health literacy rates of stroke survivors who attend a community-based educational setting. The second question examined the educational media preferences of printed, video, and computer amongst the stroke survivors both before and after viewing the different choices. The third question looked at relationships between the media preferences and health literacy levels, while question four investigated possible correlations with health literacy levels and factors of age, socioeconomic status, educational background, and time since the stroke occurred. Question five examined a possible relationship between computer use time and media preferences, and question six looked for relationships between media preferences and the factors of age, socioeconomic status, educational background, and time since stroke occurred.

Participants and Settings

This convenience sample consisted of 30 stroke survivors who took part in the post-rehabilitative services at the American Stroke Foundation Missouri and Kansas locations as well as those who attended a stroke support group held one Tuesday each month. The American Stroke Foundation locations are non-profit wellness clinics that promote education to the stroke community. A monthly fee is paid by each stroke survivor who participates in the programs available at either site and this fee is prorated depending on the income status of the participant. Any stroke survivor is welcome to enroll into this program and advertisement of the services provided by the facilities is word of mouth.

All individuals were over the age of eighteen with English as their primary language. Both males and females of all races, socioeconomic, and educational levels were considered for this study; however, individuals experiencing aphasia were excluded from participating. Aphasia can affect a person's ability to read and write as well as accurately express him or herself (Knight et al., 2006). It would be difficult to ascertain if an individual who has aphasia is reliably representing his or her consent to participate.

Procedures

After seeking and obtaining human subjects approval from the Institutional Review Boards of the University of Kansas and Rockhurst University, all subjects who met the eligibility criteria and provided willing consent participated in the study. Each participant signed a consent form before taking part in this study (Appendix E). To ensure comprehension, the consent form was created with respect for individuals with low literacy. Specific characteristics included using everyday language and avoiding complex sentences.

Demographic information of the stroke survivors including age and educational history was collected (Appendix A). Of the thirty participants, 14 were male and 16 were female. Looking at the age breakdown, 37% ($n=11$) fell between the ages of 50 to 59. The next highest number was the 60 to 69 age range with 30% ($n=9$). The mean average age was 59 years old. The majority were Caucasian ($n=27$) with 47% of all participants ($n=14$) listing some college as their highest educational level. It is interesting to note all but one of the participants had at least a high school diploma with 17% ($n=5$) having a minimum of a Master's degree. The income was fairly evenly distributed with 4 categories of income (0-20K; 21-40K; 41-60K and 81-100K) each having 7 participants. A summary of these findings are listed in Table 1.

Table 1

Descriptive Statistics for Sample

Variable	Frequency (%) (N = 30)
Gender	
Male	14 (47)
Female	16 (53)
Ethnicity	
Non-Hispanic White	27 (90)
Hispanic	1 (3)
African American	1 (3)
Other	1 (3)
Age	
30-39	1 (3)
40-49	5 (17)
50-59	11 (37)
60-69	9 (30)
70-79	4 (13)
Income	
0-20k	7 (23)
21-40k	7 (23)
41-60k	7 (23)
61-80k	2 (7)
81-100k	7 (23)
Education	
Some high school	1 (3)
High school graduate	4 (13)
Some college	14 (47)
College graduate	5 (17)
Some graduate school	1 (3)
Masters plus	5 (17)

All the participants were subjected to a vision screen that included acuity and visual field assessments. They were allowed to perform the visual tests with or without glasses. Vision can

be one sense that is impacted by a stroke, and it was important to ensure the participants had functional vision so they could see the nutrition label. Functional vision is considered the vision necessary to participate in vision-related activities such as reading, writing, orientation, and facial recognition (Colenbrander, 2003).

To assess visual acuity, The Warren Near Acuity Text Card was used (Gutman & Schonfeld, 2003) (Appendix B). The Warren Near Acuity Test Card has sentences printed on it in varying sizes from large to small. Beside each sentence is the Snellen equivalent for that particular acuity value (Gutman & Schonfeld, 2003). For example, the first sentence is “His car is shot” and beside it is the acuity value of 20/400. Normal vision is 20/20, and if a participant has 20/20 vision he or she sees the same line of letters at 20 feet that a “normal” person sees at 20 feet. If a participant can only read the first line on the Warren Near Acuity Test Card it means indicates a visual acuity of 20/400, which means that person sees at 20 feet what a normal person sees at 400 feet.

The card was held 16 inches away from the eyes in a well-illuminated room, and the client read the card from top to bottom. The client continued to read until he or she either missed 50% of the line or letter reading speed was significantly decreased, indicating the person was having difficulty seeing the letters.

How many lines the client was able to read determined if he or she had functional visual acuity. Functional acuity is considered the ability to see near and far distances with detail (Gutman & Schonfeld, 2003). Low functional acuity is considered 20/80 to 20/1000, and blindness is greater than 20/1000 (Colenbrander, 2003). Any participant who scored 20/80 or greater was excluded from the study because that person would be in the low functional acuity category. The Newest Vital Sign requires that the participants are able to read a nutrition label, so they would need functional acuity in order to see the label.

To assess the visual fields, confrontation testing was used (Gutman & Schonfeld, 2003) (Appendix C). A visual field is the area a person sees when looking straight ahead (Gutman & Schonfeld, 2003). To assess the visual fields, the client's right eye was occluded with an eye patch and then he or she fixated his or her left eye on the left eye of the researcher. The researcher placed her arms on each side of the client's head with her hands out of the client's view behind the client's head. The researcher slowly brought one arm into the client's field of view wiggling only one finger, and the client indicated when he or she saw the wiggling finger in his or her peripheral vision. This was performed in all four visual fields; superior, left, right, and inferior and on both eyes. If the client was not able to see the wiggling finger in a field, this was indicative of a visual field loss, which excluded the participant from the study.

Each participant's cognitive level was also assessed as cognition can be affected from a stroke. The Saint Louis University Mental Status Examination (SLUMS) is a tool which can assess mental status (Tariq, Tumosa, Chibanall, Perry & Morley, 2006). This 30 point screening questionnaire tests for orientation, memory, attention and executive functions (Appendix D). Executive functions are those cognitive functions needed for a person to take action (Glogoski, Milligan & Wheatley, 2006). This includes planning and organizing the steps of the plan, implementing, and making the necessary adjustments to achieve success of the plan. The SLUMS takes approximately five to ten minutes to administer. The maximum score is thirty, and depending on the level of education (high school education or less than a high school education), a score of twenty or lower or nineteen or lower respectively indicates dementia. Any participants who scored in the dementia impairment zone were excluded from the study. This instrument has been shown to have good sensitivity and specificity in detecting dementia and better sensitivity and specificity for detecting mild neuro-cognitive disorder than the Mini-

Mental State Examination that has been considered the gold standard for measuring dementia (Tariq et al., 2006).

In summary, the participants who were included in this study were not aphasic and over 18 years of age with English as their primary language. They all demonstrated functional vision with no visual field deficits and scored above the dementia impairment zone as per the SLUMS assessment.

Group Design

There were 30 stroke survivors who participated in this study. The stroke survivors were a convenience sample of those willing to participate in the study on days when the literacy test was being administered. All participants provided demographic information and took both the vision tests and the Saint Louis University Mental Status Examination (SLUMS). Participants who were not diagnosed with aphasia and passed the visual screens and cognitive assessment met the criteria to participate. These participants were given the Newest Vital Sign (NVS) screening test. Following the screening test, each participant participated in viewing educational material from three different media groups (printed material, video, and computer). Prior to viewing the different media forms, the clients were asked if they had a preference, and once they had viewed the media types, they were asked the same question again and their responses were recorded.

Instruments

The Newest Vital Sign (NVS) was administered (Appendix F). This is a quick functional literacy screening tool designed to assess limited literacy in the health care setting (Weiss et al., 2005). Complete testing materials were obtained at no cost from <http://www.pfizerhealthliteracy.com>.

The NVS required that the participant look at an ice cream nutrition label that included various information such as serving size, calories, and ingredients. The examiner asked the participant six questions about the label, including how many calories would the participant intake if he or she ate the whole container of ice cream, how many grams of saturated fat there are, and if the participant has a peanut allergy would he or she be able to eat the ice cream (Appendix G). The internal consistency of the NVS is good (Cronbach's $\alpha > 0.76$) as is the criterion validity ($r = 0.59, p < .001$) (Weiss et al., 2005). In a study performed by Weiss et al (2005), the scores on the NVS were found to be more accurate for predicting health literacy ability than educational level or age.

The participants who were not aphasic and had met the inclusion criteria of functional vision and cognitive ability were assessed in a quiet area away from group activities and general noise. After the researcher read each of the six questions on the NVS, the participant's verbal responses were recorded by the researcher. Correct answers to scored questions were not provided since each participant took the same version of the assessment.

Each participant was then asked what educational media format they preferred from the three choices: printed, video, and computer. They were provided with the different types of media and asked to read and/or watch the educational material. The reading material was a brochure produced by the Heart Disease and Stroke Prevention and Control Program from the Massachusetts Department of Public Health and made available free of charge on the internet (Massachusetts Health Promotion, n.d.). It used the acronym FAST for Face, Arm, Speech, Time, and explains each point in detail regarding stroke warning signs. The video featured a first year occupational therapy education Rockhurst University student reading the points from the brochure in a scripted manner. The computer program, developed by the Heart Disease and Stroke Prevention and Control Program from the Massachusetts Department of Public Health

was a three minute animation providing the same information on the FAST brochure in a multimedia approach. After the participants completed the activity, they were again asked to identify their media preference and their responses were documented.

Chapter 4

Results

This chapter will present a description of computer usage and pertinent findings related to the research questions. The data and results are represented in sections with the first section outlining the computer demographic information. Each research question represents a concurrent section and is restated with the results of the findings for that particular question.

Computer demographics

When looking at computer ownership and usage, 80% ($n=24$) of the stroke survivors owned a computer and 40% ($n=12$) used it 1 to 8 hours a week. Approximately 17% ($n=5$) used the computer 9 to 16 hours and 7% ($n=2$) used the computer more than 17 hours a week. The percentage of clients who either did not use the computer or used less than 1 hour was approximately 37% ($n=11$), with 5 of these clients not using a computer at all. The computer use was varied and included social networking, internet, email, or a category named “other” that included games, online banking, and job searches. There was also a variety of combinations of all the choices, as some clients had difficulty determining what category they spent the majority of their time. See Table 2 for a more detailed outline of the computer demographics.

Table 2

Computer Demographics

Variable	Frequency (%) (N = 30)
Own a computer	
Yes	24 (80)
No	6 (20)
Computer usage ^a	
0-1	11 (37)
1-8	12 (40)
9-16	5 (17)
17+	2 (7)
Reasons for usage	
Social networking	1 (3)
Internet	5 (17)
Email	4 (13)
Other ^b	5 (17)
Combo 1 ^c	1 (3)
Combo 2 ^d	1 (3)
Combo 3 ^e	3 (10)
Combo 4 ^f	2 (7)
Combo 5 ^g	3 (10)
Do not use	5 (17)

^aHours per week. ^bJob searches, online banking and games. ^cSocial networking and other. ^dInternet and email. ^eSocial networking, internet and other. ^fInternet, email and other. ^gSocial networking, internet, email and other.

Summary of Results Related to the Research Questions

1. What are the health literacy rates among stroke survivors?

The scores on the Newest Vital Sign, which is the screening tool used to indicate limited health literacy, utilizes a 6 point scale. The number of correct items on the Newest Vital Sign ranged from 0 to 6 with a mean value of 2.63 and a standard deviation of ± 1.69 . A score of < 2 indicates marginal or inadequate literacy (Weiss et al, 2005) and 23% ($n=7$) of the stroke

survivors were within this range. A score < 4 indicates the possibility of limited literacy (Weiss et al, 2005), and 50% ($n=15$) were within this range. Only 27% ($n=8$) of the participants were within an adequate health literacy range. Table 3 represents a further breakdown of the scores.

Table 3

Health Literacy Scores of Stroke Survivors

NVS value ^a	Frequency (%) ($N = 30$)
0	4 (13)
1	3 (10)
2	8 (27)
3	7 (23)
4	2 (7)
5	5 (17)
6	1 (3)

Note: Risk status: possibility of limited health literacy = NVS score 0-3; greater than 50% chance of limited health literacy = NVS score 0-1.

^aNumber of correct answers.

2. Is written, video or computer educational media preferred by stroke survivors?

Using the nonparametric Kruskal-Wallis one-way analysis of variance by ranks statistical test, there was no significant difference in the media preferences before or after viewing the printed materials, video, and computer based on the health literacy scores. For this test, the independent variables were the printed materials, the video, and the computer; the dependent variable was the literacy scores of the stroke survivors. The results of the analysis before viewing the media is that there is not a significant difference in the medians, $(2, N = 30) = 2.136, p=.344$. Results after viewing the media indicate there is not a significant difference in the medians, $(2, N = 30) = 3.019, p=.221$. Therefore, the results conclude that a media preference does not exist amongst this sample either before or after viewing the media choices.

When looking at the specific media preferences, before viewing the media, 27% ($n=8$) of the participants chose the computer, 27% ($n=8$) chose the video, and 47% ($n=14$) preferred printed educational materials. After viewing all three media choices, the participants were again asked to record their preference. The output shows 43% ($n=13$) chose the computer, 37% ($n=11$) preferred the video, and 20% ($n=6$) chose the printed materials. Table 4 outlines this data.

Table 4

Media Preference Demographics

Variable	Viewing frequency (%) ($N=30$)	
	Before	After
Computer	8 (27)	13 (43)
Video	8 (27)	11 (37)
Printed Material	14 (47)	6 (20)

Of all the participants, 17 participants changed their initial choice after viewing the three media types. Breaking down the numbers, 7 changed from the printed media to the computer and 2 changed from the video to the computer. Therefore, 53% ($n = 9$) of the participants changed to the computer from their original media preference. For those who changed to video from their original preferred choice, 1 changed from the computer and 4 changed from the printed material. This meant 29% ($n=5$) preferred the video after viewing all three media choices. Out of the 17 participants, 18% ($n=3$) changed from the computer to the printed materials. The results are summarized on Table 5.

Table 5

Media Preference Change after Viewing Choices

Preference change	Frequency (%) (n=17)
Printed material to computer	7 (41)
Video to computer	2 (12)
Total change to computer	9 (53)
Computer to video	1 (6)
Printed material to video	4 (23)
Total change to video	5 (29)
Computer to printed material	3 (18)
Video to printed material	0 (0)
Total change to printed material	3 (18)

Out of all the participants, 43% ($n=13$) did not change their media choice after viewing the different media types. The results showed 31% ($n=4$) stayed with their choice of the computer, 46% ($n=6$) remained with the video choice, and 23% ($n=3$) stayed with printed materials. See Table 6 for a summary of the results.

Table 6

Media Preferences Which Did Not Change

Variable	Viewing frequency (%) (n=13)
Computer	4 (31)
Video	6 (46)
Printed material	3 (23)

3. Does a relationship exist between health literacy levels of stroke survivors and media preferences?

Since both variables were ordinal the nonparametric test of Spearman's rank correlation coefficient was used. There was a very weak positive relationship that was not significant ($r = .029, p = .878$). The dependent variable was health literacy levels and media preferences of printed materials; video and computer were the independent variables. Looking at the results of the statistical test, a relationship does not exist between health literacy levels and media preferences for this sample. The results are summarized on Table 8.

4. Does a relationship exist between health literacy levels of stroke survivors and the factors of age, socioeconomic status, educational background, or time since stroke occurred?

The dependent variable in this research question is the health literacy levels and the independent variables are age, socioeconomic status, educational background and time since the stroke occurred. Using the nonparametric test of Spearman's rank correlation coefficient, there was a weak relationship that was not significant between health literacy level and age ($r = -.287, p = .124$) and a fairly weak relationship that was not significant with the factor of time

since the stroke occurred ($r = -.129, p = .498$). There was a fair relationship significant at the .05 level between income and health literacy levels ($r = .358, p = .052$). A significant correlation existed between health literacy levels and education at the .05 level ($r = .436, p = .016$). Other outcome correlation statistics were a weak, non-significant relationship between the factors of age and income ($r = .202, p = .284$), and fairly weak relationships between time since stroke occurred and factors of age ($r = -.172, p = .363$), income ($r = -.130, p = .494$) and education ($r = -.131, p = .490$). A fairly weak relationship that was not significant also existed between education and income ($r = .109, p = .568$) and a very weak, non significant relationship was determined to exist between age and education ($r = -.072, p = .699$). See Table 7 for a summary of the results to research question 4.

Table 7

Correlations between Time Since Stroke, Education, Income, Age and Literacy Level

Variable	Education	Income	Age	Literacy level
Time since stroke in weeks	-.131	-.130	-.172	-.129
Education	—	.109	-.074	*.436
Income	—	—	.202	.358
Age	—	—	—	-.287
Literacy level	—	—	—	—

*Correlation is significant at the 0.05 (2 tailed).

5. Does a relationship exist between the amount of computer use time and media preference with stroke survivors?

Using the nonparametric test of Spearman's rank correlation coefficient, there was a very weak relationship that was not statistically significant ($r = .061$, $p = .749$). The independent variable was computer use time, and the dependent variable was media preference. No relationship was found between computer use time and media preferences for this sample. See Table 8 for a summary of the results.

Table 8

Correlations between Literacy Level, Use of Computer and Media Preferences

Variable	Three media preferences
Literacy level	.029
Average use of computer	.061

* $p < 0.05$, two-tailed.

6. Does a relationship exist between media preferences and factors of age, SES, educational background, or time since stroke occurred?

The independent variables in this research question were age, socioeconomic status, educational background, and time since the stroke occurred and the dependent variable was the media preferences. Using the nonparametric test of Spearman's rank correlation coefficient, there was a fairly weak relationship that was not significant between media preferences and education ($r = .107, p = .573$). A very weak, non-significant relationship existed between media preferences and the factors of age ($r = .014, p = .943$), income ($r = .038, p = .843$) and time since stroke occurred ($r = .067, p = .724$). Therefore, there were no correlations between media preferences and age, SES, education, or time since the stroke occurred. Results are summarized on Table 9.

Table 9

Correlations between Time Since Stroke, Education, Income, Age and Media Preferences

Variable	Education	Income	Age	Three media preferences
Time since stroke in weeks	-.131	-.130	-.172	0.067
Education	—	.109	-.074	0.107
Income	—	—	.202	0.038
Age	—	—	—	0.014
Three media preferences	—	—	—	—

* $p < 0.05$, two-tailed.

Chapter 5

Discussion, Implications, and Recommendations

The purpose of this study was to describe and compare the health literacy levels of stroke survivors and media preferences with the effects of age, socioeconomic and educational background, and length of time since the stroke occurred. This researcher sought to address the issue of assessing health literacy levels when providing educational media to stroke survivors. The subjects in this study attended a post-rehabilitative community based setting called the American Stroke Foundation which has locations in Kansas City, Missouri and Mission, Kansas. The stroke survivors live in their own homes and attend a day program and/or a monthly support group at the American Stroke Foundation locations. The first research question looked at the health literacy rates of this sample. Results indicate there is a concern for the majority of this sample with their health literacy ability. The second question looked at media preferences of the stroke survivors and the majority of the sample picked printed materials before viewing the media choices of print, video and computer. After viewing the media, approximately one half preferred the computer and about one third preferred the video. The third question looked at relationships between the media preferences and health literacy levels, and it found a weak non-significant relationship. The fourth question looked at health literacy levels and factors of age, socioeconomic status, educational background, and time since the stroke occurred. There were significant relationships between the health literacy levels and educational background and income. No other significant relationships were found. The fifth question found there was not a significant relationship between computer use time and media preferences. There were also no significant results for question six in regards to relationships between media preferences and the factors of age, socioeconomic status, educational background, and time since stroke occurred.

This chapter includes discussion of findings, limitations to this study, and implications for practice. Discussion of findings focuses on the data as it relates to each research question. Limitations of this study will then be discussed with suggestions for overcoming some of the limitations. The third section, implications for practice, relates to specific ways the results may be applied to practitioners' methods for health care education provision and delivery as well as future studies.

Discussion of findings

1. What are the health literacy rates among stroke survivors?

The first research question focused on the health literacy levels of this sample. According to the scoring criteria on the 6 point scale of the Newest Vital Sign, a score of less than 2 equates to a greater than 50% chance the participant has marginal or inadequate literacy skills (Weiss et al., 2005). A score of less than 4 indicates the possibility of limited literacy. The Newest Vital Sign is as sensitive for identifying people with inadequate health literacy as other health literacy assessments that take a longer time to administer (Weiss et al., 2005). For this study approximately one quarter (23%) of the stroke survivors scored lower than 2, which is highly indicative for health literacy issues. Clinicians must be careful of their communication with participants who scored at this level, and this includes the provision of any educational media (VanGeest, Welch & Weiner, 2010; Weiss et al., 2005). Another half of the stroke survivors (50%) scored lower than 4 indicating the possibility they have limited literacy skills (Weiss et al., 2005). The mean score for this sample was 2.63. In a larger scale study by Weiss et al. (2005), a mean score of 3.4 on the Newest Vital Sign for English speaking participants was documented.

More than two-thirds of this sample was identified as being at risk for limited health literacy using the Newest Vital Sign, thus making them at significant risk of adverse health

outcomes (DeWalt, Berkman, Sheridan, Lohr, & Pignone, 2004). Cerebrovascular accidents occur from a multitude of nonmodifiable risk factors including age and ethnicity, and modifiable risk factors which include hypertension, management of diabetes, and cigarette smoking (Gillen, 2006). DeWalt et al. (2004) related literacy ability to overall health and health care knowledge as well as global measures for health. Lower reading ability was linked to poor management of these concepts. The stroke survivors at the American Stroke Foundation are provided with education on a daily basis in regards to healthy living and management of pre-existing conditions such as hypertension. However, over two-thirds of this sample is at risk for limited health literacy according to their Newest Vital Sign scores. Ultimately, the majority of this sample may not be able to understand the education provided to them nor be capable of managing their health issues due to poor comprehension.

The 73% adult inadequate health literacy rate for this sample is not consistent with the 1993 and 2003 U.S Department of Education Adult Literacy Studies that reported 34 to 51% of American adults have low levels of health literacy (Kirsch et al., 1993; Kutner et al., 2006). One possibility for this result is this sample is more susceptible to low health literacy due to the effects of the stroke. No data exists which looks at health literacy scores of stroke survivors therefore, at this time, there are no studies for comparison. However, cognition including memory can be affected after a stroke (Gillen, 2006). Although these participants took the St Louis University Mental Status Examination and did not score in the dementia area, the St Louis University Mental Status Examination is sensitive for detecting mild neurocognitive disorder (MCND). The researchers who developed the St Louis University Mental Status Examination set the point scale criteria for the diagnosis of MCND as 20 to 24 for less than high school education and 21-26 for at least a high school education. Twenty-one of the thirty stroke survivors from the American Stroke Foundation scored within this range, meaning over two-

thirds of this sample demonstrated slightly impaired cognition. MCND includes decreased memory, disturbances in executive functioning or attention and impairment in perceptual-motor abilities (Tariq et al., 2006). People with MCND are able to function independently in daily life; however, these types of disturbances are cognitive in nature and as noted strokes can affect cognition. Successful health literacy skills require that the person has cognitive function that is adequate to remember the health education he or she receives (Wilson et al., 2010). Cognitive ability was not as strong in this sample, which could account for the low health literacy scores.

Another possibility for the low Newest Vital Sign scores may be the intricate math skills required to answer questions 1 through 4 (Ozdemir et al., 2010). Other health literacy assessments such as the Rapid Estimate of Adult Literacy in Medicine (REALM) only assess the ability to read words, yet health literacy is a complex interaction between reading, counting, listening, comprehending, analyzing, and problem solving. For example, when taking a medication, the client must understand how much to take, when to take the medication, what types of food can or cannot be eaten, what are the side effects, and possible drug interactions (Rudd, 2007). In a study examining older adults and health insurance literacy, McCormack, Bann, Uhrig, Berkman and Rudd (2009) determined participants had more difficulty with insurance items that required interpretation and application of numeracy information.

Studies have found the Newest Vital Sign has a high sensitivity for detecting limited health literacy when compared to other health literacy assessments which makes it an effective screening tool in a clinical setting (Osborn et al., 2007; Weiss et al., 2005). This sensitivity may be better at separating out those who would have scored on the low end of adequate literacy with other assessments. This needs to be examined further. The Newest Vital Sign is a newer health literacy assessment, and currently there is a paucity of research.

2. *Is written, video or computer educational media preferred by stroke survivors?*

The second research question addressed the stroke survivors' preferences for written, video, or computer educational media. Statistically, there were not any significant findings for preference either before or after looking at the media choices. However, in regards to the actual numbers and the participants' preferences, there are some interesting results. Table 4 indicates almost half the sample chose printed materials before looking at the different media types. However, after viewing the different formats, there was a shift in preference with 80% of the sample now choosing either the computer or the video. Table 4 indicates over half of the sample switched from their original choice to another, and Table 5 outlines the preference changes with approximately one-third revising their initial predilection to the computer.

Familiarity may have played a role in the initial preference pick because printed material is the most common form of educational media (Basch et al., 2004; Bernier, 1993). The majority of occupational therapists provide educational materials in a printed format for a variety of reasons, including ease of use, portability, consistency of education, and self pacing of learning (Griffin et al., 2003; Griffin et al., 2006; Hoffman, et al., 2007). This is the primary format (after verbal) in the provision of education to the clients at the American Stroke Foundation and clients are well acquainted with this media. However, exposure to all media choices initiated a change of preference for the majority of the sample. Videos and computer programs offer visual input which has been found to be more appealing for those with low literacy (Vollandes et al., 2007). Almost three-quarters of this sample demonstrated inadequate health literacy as per the Newest Vital Sign, so the appeal of the visual images may have been the determinant for the conversion.

Great variability for the provision of health education materials is now available (Andrulis & Brach, 2007; Meade et al., 1994). Videos, computers, and interactive programs are becoming popular alternatives to printed materials. Visual images have been shown to improve

the communication of information and education (Frosch, Kaplan, & Felitti, 2003). For health care practitioners, choosing the most convenient format for them to produce (printed), may not necessarily be what is best for the client. Asking the clients may only yield an answer to the educational media they are familiar with, not what is best for their situation. This may have been the case in this study. Studies examining other media formats and effectiveness for low literacy populations are mixed (Frosch et al., 2003; Glasgow et al., 2010; Volandes et al., 2007). These studies used educational media to substitute rather than complement information provided by health care professionals. There was also significant variability in the skills required to access the education. For example, putting in a video or DVD and pushing the play button versus negotiating one's way around a website requires different types of abilities, which may account for the variations in effectiveness (Frosch et al., 2003).

Evaluations of alternatives to printed materials for health education largely focus on usefulness, not the consumer's preference (Glasgow et al., 2010; Kinnane et al., 2008; Licciardone et al., 2001; Miller et al., 2005; Murphy et al., 2000; Volandes et al., 2007). There is a paucity of research on media preferences, and no research exists in regards to stroke survivors and educational media preferences. Studies do indicate this population wants information, and visual images of health related materials focusing on stroke may be of benefit (Fang et al., 2008; Hangar et al., 1998; Knight et al., 2006). However, individualized printed materials for stroke survivors have also been documented as a successful adjunctive measure to augment education (Hoffman et al., 2007; Lowe, Sharma, & Leathley, 2007).

There has been exponential growth and popularity in the use of computers and the internet for health related searches (Frosch et al., 2003; Tian & Robinson, 2008). Four stroke survivors did not waver from their computer preference after viewing the different formats, while nine did convert to the computer choice. This meant 13 out of 30 stroke survivors preferred the

computer at the end of the study. Exploration of this media type as an alternative educational method is still in its infancy, but initial research indicates it can be an effective method for education (Miller et al., 2005).

The data on the video preferences indicated 6 participants did not vacillate while 5 stroke survivors chose video after viewing the media types. In total, 11 stroke survivors preferred the educational video at end of this study. Audiovisual media offers a communication method that might be of interest to low literacy clients (Klein-Fedyshin et al., 2005; Volandes et al., 2008). The use of video overcomes the inadequate literacy issue, as there are no words to read creating a format which is easier to understand. Video has been found to be satisfactory and beneficial in the teaching of health related education (Kinnane et al., 2007; Murphy et al., 2000). Favorable responses from the stroke survivors to this audiovisual format may be indicative of ease of understanding that this media type propagated, which increased the satisfaction.

3. *Does a relationship exist between health literacy levels of stroke survivors and media preference?*

The third question examined whether there was a correlation between the health literacy levels and media preferences. No statistical significance was discovered, thus there was no relationship between the media preferences and health literacy levels. For this sample, it can be postulated a high or low literacy score on the Newest Vital Sign does not determine an educational media preference. This knowledge can be meaningful from a clinical perspective. To create a client centered atmosphere, clinicians have to be sensitive to the client's needs. It is the responsibility of the clinician to ensure all education is provided at an understandable level (Paasche-Orlow, Schillinger, Greene, & Wagner, 2006). An assessment of the client's health literacy ability with the Newest Vital Sign can provide enough information to determine what level of education is most effective. Using media formats that are relevant and understandable

increases the satisfaction of the user (Hoffman et al., 2007; Klein-Fedyshin et al., 2005; Lowe et al., 2007; Volandes et al., 2008). Protocols could already be in place in the clinical setting which link certain Newest Vital Sign scores to certain media formats. For example, an adequate health literacy score could equate to the provision of printed material written at a sixth grade level. An inadequate health literacy score could mean using videos to provide the same education, as this format is more agreeable for low literacy (Klein-Fedyshin et al., 2005; Volandes et al., 2008). The lack of significance in regards to the preference would allow the clinic to match the best media format to specific health literacy levels.

Another positive clinical association of not having a media preference linked to health literacy levels is there may be an increased acceptance of using computers for educational purposes regardless of the ability of the client. Using computers and the internet for health related education is a newer concept that has not been fully explored. As mentioned, this method shows promise for positive delivery of health education (Miller et al., 2005). There is a trend for younger populations to use the internet to obtain health information while older populations rely more on printed materials but this may be related more to familiarity with those methods rather than a preference (Licciardone et al., 2001; Tian & Robinson, 2008).

4. *Does a relationship exist between health literacy levels of stroke survivors and the factors of age, SES, educational background, or time since stroke occurred?*

Research question four looked at the relationship of health literacy with the factors of age, socioeconomic status, educational background, and time since the stroke occurred. No statistical significance was determined for the age variable. An inverse relationship with age and health literacy has been consistently documented (Gazmararian et al., 1999; Kirsch et al., 2002; Kutner et al., 2006; Paasche-Orlow et al., 2005; Shah et al., 2010; Wolf et al., 2006). Advancing age has been associated with declining health literacy levels. However, the studies documenting

this significant association have researched elderly people who are generally categorized at the Medicare age of 65 or older. The mean age of this sample of stroke survivors was 59, which could contribute to the lack of significance.

Time since the stroke occurred was another variable that was not statistically significant when correlated with health literacy in this study. The average time since the stroke occurred was 6 years. No studies were found that look at the relationship between length of time post stroke and health literacy levels. Neuroplasticity of the brain may be a contributing factor to findings in this study. Neuroplasticity is essentially the ability of the brain to reorganize itself after damage, through either existing neural pathways or development of new neural connections (Preston, 2006). This rewiring occurs at different stages and rates for different people, and it depends on how much damage was incurred, the age and overall physical and emotional health of the person, and quality and the amount of time with the therapy interventions. In the past it was generally thought the brain could only improve for approximately 6 months after injury; however, current research indicates there may not be a “cut off” time (Wolpaw & Carp, 2006). There is increasing evidence that the damaged brain can reorganize indefinitely (Forrester et al., 2007; Johansson, 2011; Wolpaw & Carp, 2006). This constant remodeling and individualized pacing of recovery can mean each person has a particular level of function including health literacy ability that has nothing to do with the time since the stroke occurred. Therefore, depending on the person, the nature of the change may not be easily predicted. The idea of limitless reorganization is a very new finding and one which needs additional studies.

A significant relationship between the health literacy ability and education levels of the stroke survivors was found. The demographics from Table 1 show only one participant did not graduate from high school while almost half of the sample experienced some college. Even though this significant result is supported by the literature (U.S. Department of Education,

National Center for Education Statistics, 2007), caution must be exercised. The result was strong, but education should not be assumed to act as a substitute for health literacy. Years of school is not an accurate indicator of educational attainment (Baker et al., 1999; Gazmararian et al., 1999; Kirsch et al., 1993; Paasche-Orlow et al., 2005; Shea et al., 2004; Williams et al., 1995). For example, completion of a high school education in one school may not equate to the same level of educational attainment at another school. When health care professionals provide educational material, they need to be cognizant that years in school is not necessarily representative of a client's literacy level.

The correlation between health literacy levels and income was determined to be statistically significant in this study. As per Table 1, the income statistics in this sample were fairly evenly distributed. Although there are few studies that directly correlate income to health literacy levels, there is research support that income can be indirectly linked to education and education linked to health literacy (McCormack et al., 2009; Zahnd et al., 2009). The strong relationship between health literacy levels and income is more than likely due to the function of education level. Once again, caution must be exercised due to the unequal quality of education within the U.S. (Baker et al., 1999; Gazmararian et al., 1999; Kirsch et al., 1993; Shea et al., 2004; Williams et al., 1995).

5. *Does a relationship exist between amount of computer use time and media preference with stroke survivors?*

No significance was found between the amount of computer use time and media preferences. Table 2 provides the demographics for computer usage and 24 of the participants own a computer. The majority of the participants in this sample used the computer between zero and eight hours a week for a variety of reasons, including checking email, using the internet, and playing games.

The lack of significance can indicate the amount of time an individual spends on the computer does not influence what type of media he or she prefers. This result poses some difficulty in interpretation and thus information about the provision of appropriate media. It will require additional study. Common logic suggests that familiarity and use would dictate media choice, but clearly that is not the case here.

One interpretation for this finding could be an older person who research has shown is less likely to use the internet for health education purposes (Licciardone et al., 2001) would still be accepting of this type of media. A younger person who is more likely to use the internet (Tian & Robinson, 2008) would still be disposed to learning health information in a printed format. For a clinician, knowing any type of educational media would be acceptable regardless of age can create a “sense of freedom” for that clinician. It alleviates the pressure to perform a search for a particular media format during the client’s appointment which can consume the limited time available in a busy health care environment. Clients are more concerned with being provided with education about their diagnoses (Basch et al., 2004; Hanger et al., 1998; Kinnane et al., 2007; Murphy et al., 2000). The format does not appear to be as important, as long as the education is provided at an understandable level and is accessible (Licciardone et al., 2001; Murphy et al., 2000).

6. *Does a relationship exist between media preferences and factors of age, SES, educational background, or time since stroke occurred?*

The final research question looked at the media preferences and the factors of age, SES, educational background, and time since the stroke occurred. No significant results were found. This means it is possible to explore the “best approach” to educate clients. Results indicate better learning occurs with graphics and narration such as those found in computer programs (Low & Sweller, 2005). There is an increased use of the internet to seek information about

disease management, prognosis, and therapeutic interventions, especially amongst younger, more educated populations who have internet accessibility at home (Basch et al., 2004; Licciardone et al., 2001; Tian & Robinson, 2008). However, most medical information provided on the internet is written at a literacy level that is too high for the majority of the population to understand (Wilson, 2003). It is important for consumer based health education websites to consider health literacy levels; this concept needs further study. Also, the effectiveness of this media needs additional investigation (Frosch et al., 2003; Glasgow et al., 2010; Miller et al., 2005; Zyskind et al., 2009).

Another consideration to the “best approach” thought is utilizing the method that is most ideal for the concept being taught. For example, does a clinician provide a DVD exercise program for home use or pages of printed materials with lengthy descriptions of each exercise and stick figures showing the movements? Consideration to the client’s needs as well as literacy levels and media access all need to be accounted for in the provision of educational media.

Conclusions

This study examined health literacy levels of stroke survivors and their media preferences. Even though it was a small convenience sample, significance was determined for income and education with health literacy levels which supports other studies’ findings. Socioeconomic status, age, and time since the stroke occurred along with income and education were not significant when correlated with media preferences, indicating that delivery of educational materials in printed, video, or computer form could be acceptable.

The percentage of inadequate health literacy scores for this sample was below the U.S Department of Education Adult Literacy Studies results (Kirsch et al., 1993; Kutner et al., 2006). This indicates clinicians must be careful with their communication, making sure they are providing education that is easily understood, they need to keep in mind that they should not

determine the type of educational material based on the amount of years a person attended school. A quick health literacy assessment can alert the practitioner if there are literacy concerns so that communication can be adjusted to the appropriate level in order to maximize understanding and learning.

The focus at the American Stroke Foundation is to provide education to stroke survivors. This education is supplied in both verbal and printed formats. It encompasses many topics including signs and symptoms of a stroke, and the importance of nutrition and exercise in the prevention of future strokes. With the increased possibility of limited cognition from the effects of the stroke, inadequate health literacy may not be obvious, which in turn means the education is not understood. The lack of comprehension can lead to decreased compliance because the clients do not know what they are supposed to do, and the result is poor health outcomes. More globally, occupational therapists work daily with people who may have limited literacy skills due to a variety of issues including age and cognition. There is not a “gold standard” that would allow a therapist to immediately recognize a client with low health literacy skills. Occupational therapists need to be cognizant that low literacy is a very real concern. They occupy a unique position in that they can assess health literacy ability in addition to the other assessments performed during the initial evaluation. Doing so would immediately create an atmosphere where the communication level is appropriate for maximizing the educational experiences and interactions with the client.

Health literacy has not traditionally been an area of concern to occupational therapists and thus is generally not assessed. However, due to the high amount of education provided by occupational therapists within the health care environment, it needs to move into the forefront. As per the results of this sample, there appears to be no preference for delivery of educational

media. This opens the door for practitioners to determine the best format to meet the needs and abilities of the client and thus maximize the learning opportunities.

Limitations of the study

There are several limitations to this study. First, it lacks external validity. This study was comprised of a small convenience sample of 30 stroke survivors who attended one type of community program. There are many different types of settings survivors can attend after having a stroke. At the same time, not all stroke survivors need therapy; many return to their regular lives without any functional issues. The diversity of the diagnosis was not represented within this small sample, and it may not be possible to do so. Future studies should examine the health literacy abilities of stroke survivors within specific environments in order to determine if particular types of settings equate to certain health literacy levels.

Another limitation of this study was the homogeneity of the sample. According to Table 1, 90% of the sample was white and all spoke English as their primary language. Only one survivor did not graduate from high school, and all but three survivors had their strokes more than a year ago. This means subsets of non-whites, non-English speaking, those with limited education, and those with more recent strokes were not represented. This lack of variability severely limits the results. It is not clear how scores would perform for different groups defined by ethnicity, but race has been consistently reported to affect health literacy (Baker et al., 2002; Morrow et al., 2006; Paasche-Orlow et al., 2005; Shah et al., 2010; Williams et al., 1995; Wolf et al., 2005). By not including non-English speaking people, a significant portion of the low literacy population has been overlooked (Paasche-Orlow et al., 2005; Shea et al., 2004; Weiss et al., 2005; Williams et al., 1995). Years of schooling is not a true marker for knowledge attainment, but at the same time, diversity of educational accomplishment was not represented in this small sample ((Baker et al., 1999; Gazmararian et al., 1999; Kirsch et al., 1993; Paasche-

Orlow et al., 2005; Shea et al., 2004; Williams et al., 1995). There are no studies that look at literacy ability and time since the stroke occurred, but people who have had strokes less than a year ago may have different literacy abilities than those whose strokes occurred a longer time ago.

The exclusion criterion of aphasia, cognitive difficulties, and visual deficits limits people with certain types of strokes who can participate and may not allow for fair representation of the stroke population. Because having a stroke can compromise vision, cognitive function, and/or speech patterns, it would be difficult to generalize any findings about relationships between these variables and health literacy levels. An important next step would be to investigate these factors and health literacy in samples of healthy adults.

These three criteria were used to exclude stroke survivors. Using the Newest Vital Sign in the way it was designed and including stroke survivors who have those deficits would impact the accuracy of the responses. Visual deficits affect looking at the nutrition label, which is necessary to answer the questions. Cognitive deficits and aphasia affect the ability to follow the instructions and to verbally respond. These criteria are all possible side effects of a stroke (Gillen, 2006; Wellwood et al., 1994). Occupational therapists evaluate and assess these deficits in order to provide interventions for functional independence. Researchers are beginning to appreciate the impact of visual and cognitive deficits on health literacy ability (Harrison et al., 2010; Morrow et al., 2006; Paasche-Orlow et al., 2005; Wilson et al., 2010). Most health literacy studies did not evaluate vision or cognition, assuming normal or corrected vision and normal cognition (Paasche-Orlow et al., 2005). Not assessing these factors has likely produced underestimated health literacy results.

For this study, using criteria to exclude participants who were impaired may have yielded a more accurate representation of the health literacy abilities of this sample without the

confounding issues of vision and cognition. Wilson et al. (2010) reported health literacy ability was determined by the ability of the participants to remember health education and the strength of this ability came from the participants' cognitive abilities. Future studies must assess cognitive ability and vision to produce more accurate health literacy scores especially in the older population where these deficits are more common (Paasche-Orlow et al., 2005).

Implications for practice

The Stroke Foundation is a community based nonprofit organization. This type of setting relies on providing education in both verbal and printed formats to its clients. Assessing health literacy levels may increase staff sensitivity in regards to client literacy ability and ensure the provision of appropriate education. But the question of whether screening will indeed help staff improve health literacy outcomes is beyond the scope of this study. Screening for low health literacy can assist clinicians with identifying those clients who need to have their education tailored to suit their literacy needs (VanGeest et al., 2010). Tailoring the education creates understandable materials, allowing clients to make more informed decisions (Magasi, Durkin, Wolf, & Deutsch, 2009). Poor understanding of health care education leads to clients devaluing the information, which in turn affects compliance. Creating comprehensible education increases compliance, and this allows clients to take the appropriate steps to improve their health (Chew, Bradley, & Boyko, 2004; Dolon et al., 2004; Gazmararian et al., 1999; Safeer & Keenan, 2005). Gannon and Hildebrandt (2002) found marginalization increased when educational materials were not adapted to the literacy ability of health care participants. To function adequately within the health care system, clients need to be able to read consent forms and prescription labels, understand written and oral communication with health care professionals, and successfully act on medical instructions. This active engagement is addressed within the Healthy People 2010

and 2020 initiatives (U.S. Department of Health and Human Services, 2000; U.S. Department of Health and Human Services., n.d).

Occupational therapists are in a position to assess and ensure the educational needs of the client are met (Costa, 2003). Screening is not necessary for every client (Wallace et al., 2006). But certain diagnoses, such as those affecting cognition, may be more suspect for having health literacy issues and warrant an assessment. As the occupational therapist evaluates the client in the areas of activities of daily living, upper extremity function, cognition and vision, an additional quick screen of health literacy ability will help define the level of education and communication best suited for the client for the rest of the therapy process. Participation and client acceptance of a health literacy assessment does not appear to be the problem or source of embarrassment past studies have alluded to (Shah et al., 2010).

Delivery of health education does not appear to be influenced by a particular media format type. What does matter is that the education must be relevant to the client's situation and understandable (Basch et al., 2004; Hanger et al., 1998; Kinnane et al., 2007; Licciardone et al., 2001; Murphy et al., 2000). Low literacy clients benefit from tailored education that utilizes simple language and pictorials (Hoffman et al., 2007; Morrow et al., 2006). The education can be effective if it is delivered in print, video, or computer format (Basch et al., 2004; Frosch et al., 2003; Kinnane et al., 2007). Depending on the facilities and availability of the supplies such as AV equipment or computers, the format utilized should be suited to the functionality of the department. If the department is more antiquated and only has a VCR available, videotapes with health education could be made accessible to the clients. As long as the videotapes present relevant, understandable education in a concise manner, they can be a time saving method for clinicians and satisfactory for the client (Frosch et al., 2003; Klein-Fedyshin et al., 2005; Murphy et al., 2000). Computers can provide better learning opportunities for low literacy clients

because of the graphics and narration possibilities (Low & Sweller, 2005). Printed materials can also be effective as long as they are individualized, understandable, and have pictorials for low literacy clients (Hoffman et al., 2007). All these media types need further investigation to determine if more precise literacy instruments can be developed that maximize the client's learning potential while accounting for accessibility and the client's situation (Basch et al., 2004; Frosch et al., 2003; Kinnane et al., 2007).

More health literacy scores of stroke survivors must be collected in order to address the possible literacy trends with this population at certain stages of recovery. Future studies are also needed to assess whether appropriate education and formats for specific health literacy scores can be predetermined. This could have implications for health care providers regarding their ability to immediately provide education in a particular format based on a specific health literacy score without having to guess what would maximize the client's learning. Studies need to be performed that look at cognition, vision and health literacy scores to determine if there are links that have implications for certain diagnoses necessitating health literacy assessments. Continued studies are needed to determine if there can be one health literacy assessment that addresses all the areas within health literacy. The end goal would be consistency in the reporting of health literacy ability and the ability to apply the results across all health care disciplines. Other studies are needed that look at client preferences and effectiveness of media in order to provide more client centered care.

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Appendix A

Demographic Survey

When did the stroke occur _____

Location of the stroke _____

Age:

Gender: Male ☐ Female ☐

Highest Education Level Completed:

Some High School ☐High School Graduate ☐Some College ☐College Graduate ☐Some Graduate Level ☐Master's Degree or Higher ☐

If did not graduate from high school what was reason _____

Household Income:

\$0 – \$20,000 ☐\$21,000 – \$40,000 ☐\$41,000 – \$60,000 ☐\$61,000 – \$80,000 ☐\$81,000 – \$100,000 ☐\$100,000 and above ☐Race: Caucasian ☐ Hispanic ☐ Native American ☐African American ☐ Asian American ☐ Other ☐

Appendix A continued

Do you own or use a computer? _____

How much computer use a week:

1 to 8 hours ☐

8 to 16 hours ☐

Greater than 16 hours ☐

Do you use the computer alone or with help? Alone ☐
 With help ☐

What is/are the main reason(s) you use the computer?

Word processing ☐

Social networking ☐

Internet searches ☐

Email ☐

Other ☐ _____

If you were given a display of information on the computer, a video to watch or a pamphlet to read which would you prefer?

Computer ☐

Watch a video ☐

Read a pamphlet ☐

AFTER THE INTERVENTION ASK THE FOLLOWING QUESTION:

Now that you have been given the information in the different ways, which do you prefer?

Computer ☐ Watch a video ☐

Read a pamphlet ☐

Appendix B

THE WARREN TEXT CARD

His car is shot.

Snellen Equivalent	Metric Diopters Print Size	Needed*
20/400	8.0M	20

The cat is black.

20/320	6.3M	16
--------	------	----

She has many grey hairs.

20/250	5.0M	12.5
--------	------	------

Steve cannot do that trick.

20/200	4.0M	10
--------	------	----

THIS CARD IS CALIBRATED FOR USE AT 40 CM (16 IN) WITH CUSTOMARY READING CORRECTION IF NEEDED
* APPROXIMATE MINIMUM NUMBER OF DIOPTERS NEEDED TO READ 1M (8 PT) PRINT
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Appendix B continued

THE WARREN TEXT CARD

I may not need many pickles.

The red jacket is very shiny.

The gold dish has grey stripes.

Cary shouldn't shake the juice.

She cannot change the picture.

Kim does not like to wear cold shoes.

Jill can take some cookies for lunch.

Beck knows eat a lot of green grain.

I could have grown some for money.

My mother likes eating the apples.

Snellen Equivalent	Metric Diopters Print Size	Needed*
20/160	3.2M	8
20/125	2.5M	6.5
20/100	2.0M	5
20/80	1.6M	4
20/63	1.25M	3
20/50	1.0M	2.5
20/40	.8M	2
20/32	.63M	1.5
20/25	.5M	1.25
20/20	.4M	0

THIS CARD IS CALIBRATED FOR USE AT 40 CM (16 IN) WITH CUSTOMARY READING CORRECTION IF NEEDED

*APPROXIMATE MINIMUM NUMBER OF DIOPTERS NEEDED TO READ 1M (8 PT) PRINT

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Appendix C

Vision Testing

Visual field is the space one is able to see when looking straight ahead. The normal field of vision is approximately 160° binocularly. Monocular field of vision is 60° superiorly, 75° inferiorly, 60° nasally, and 100° temporally.

Confrontation Testing

- In a well-illuminated room, place the patient in a seated position. Sit opposite from the patient at approximately 1 meter.
- Occlude the patient's right eye with an eye patch.
- Instruct the patient to fixate on the therapist's left eye.
- Place both arms behind the patient's head (out of the patient's field of view).
- Slowly bring one arm into the patient's field of view, wiggling only one finger.
- Present the target four times.
- Test the superior, left, and right visual fields, and the inferior visual field.
- Instruct the patient to say "now" or raise his or her hand when he or she first sees the wiggling finger.
- Repeat with the left eye occluded.

Gutman, S. A., & Schonfeld, A. B. (2003). Visual screening. *Screening adult neurologic populations* (pp. 31-55). Bethesda, MD: American Occupational Therapy Association.


Appendix D

Saint Louis University

Mental Status (SLUMS) Examination

Name _____ Age _____
 Is patient alert? _____ Level of education _____

_____/1
 ____/1
 ____/1
 ____/3
 ____/3
 ____/5
 ____/2
 ____/4
 ____/2
 ____/8

- ① 1. What day of the week is it?
- ① 2. What is the year?
- ① 3. What state are we in?
4. Please remember these five objects. I will ask you what they are later.
 Apple Pen Tie House Car
5. You have \$100 and you go to the store and buy a dozen apples for \$3 and a tricycle for \$20.
 ① How much did you spend?
 ② How much do you have left?
6. Please name as many animals as you can in one minute.
 ① 0-4 animals ② 5-9 animals ③ 10-14 animals ④ 15+ animals
7. What were the five objects I asked you to remember? 1 point for each one correct.
8. I am going to give you a series of numbers and I would like you to give them to me backwards.
 For example, if I say 42, you would say 24.
 ① 87 ② 649 ③ 8537
9. This is a clock face. Please put in the hour markers and the time at ten minutes to eleven o'clock.
 ② Hour markers okay
 ② Time correct
- ① 10. Please place an X in the triangle.
 
 ① Which of the above figures is largest?
11. I am going to tell you a story. Please listen carefully because afterwards, I'm going to ask you some questions about it.
 Jill was a very successful stockbroker. She made a lot of money on the stock market. She then met Jack, a devastatingly handsome man. She married him and had three children. They lived in Chicago. She then stopped work and stayed at home to bring up her children. When they were teenagers, she went back to work. She and Jack lived happily ever after.
 ② What was the female's name?
 ② When did she go back to work?
 ② What work did she do?
 ② What state did she live in?

TOTAL SCORE _____



Department of
Veterans Affairs



SAINT LOUIS
UNIVERSITY



SCORING

High School Education		Less than High School Education
27-30	Normal	25-30
21-26	MNCD*	20-24
1-20	Dementia	1-19

*MNCD=Mild neurocognitive disorder

Appendix E

Stroke Survivors and Health Literacy Skills Consent Form

INTRODUCTION

The Department of Education at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You may refuse to sign this form and not participate in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time. If you do withdraw from this study, it will not affect your relationship with this unit, the services it may provide to you, or the University of Kansas.

PURPOSE OF THE STUDY

You are being asked to be a part of a research project learning about health literacy levels of stroke survivors and which way you prefer to receive education about stroke.

PROCEDURES

You will be asked to complete a vision test and a test of thinking ability. You will also be asked to answer questions based from information on a food label. You will also be asked to read and watch education about stroke and decide which type you like the most. This should take about 30 to 45 minutes.

RISKS

There is minimal risk of emotional stress during testing involved with this study.

BENEFITS

Results of the study will lead to a better understanding of health literacy levels of stroke survivors. This will help occupational therapists develop understandable handouts for patient and family education. It will help occupational therapists to understand what type of educational material is preferred by patients.

PAYMENT TO PARTICIPANTS

You will not be rewarded with money or objects for taking part in this study.

Appendix E continued

PARTICIPANT CONFIDENTIALITY

Your name will never appear on any test or tool used in the study. No identity will be made in the data analysis. Instead the researcher will use a study number rather than your name. Your identifiable information will not be shared unless required by law or you give written permission. Permission granted on this date to use and disclose your information remains in effect indefinitely. By signing this form you give permission for the use and disclosure of your information for purposes of this study at any time in the future.

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, you cannot participate in this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

You do not have to participate in this study. You are free to stop at any time without punishment. If you choose to stop, you will still be able to participate in other activities at the American Stroke Foundation.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researcher(s) listed at the end of this consent form.

PARTICIPANT CERTIFICATION:

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my rights as a research participant, I may call (785) 864-7429 or (785) 864-7385, write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email mdenning@ku.edu.

Appendix E continued

I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

Type/Print Participant's Name

Date

Participant's Signature

Researcher Contact Information

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Curriculum and Teaching

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Lawrence, KS 66045

785 864 9666

Appendix F

Nutrition Label for Newest Vital Sign

Nutrition Facts			
Serving Size		½ cup	
Servings per container		4	
<hr/>			
Amount per serving			
Calories	250	Fat Cal	120
			%DV
Total Fat 13g		20%	
Sat Fat 9g		40%	
Cholesterol 28mg		12%	
Sodium 55mg		2%	
Total Carbohydrate 30g		12%	
Dietary Fiber 2g			
Sugars 23g			
Protein 4g		8%	
<hr/>			
*Percentage Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.			
Ingredients: Cream, Skim Milk, Liquid Sugar, Water, Egg Yolks, Brown Sugar, Milkfat, Peanut Oil, Sugar, Butter, Salt, Carrageenan, Vanilla Extract.			

Score of 4-6 almost always indicates adequate literacy.

[illegible]