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HEALTH LITERACY AND MEDICATION ADMINISTRATION KNOWLEDGE OF UNLICENSED HEALTH CARE WORKERS IN ASSISTED LIVING FACILITIES

A MASTER'S PROJECT SUBMITTED TO THE GRADUATE FACULTY
GRADUATE SCHOOL BETHEL UNIVERSITY

BY KELSEY WALCZAK AND LYNSEY KISSINGER

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ABSTRACT

The purpose of this research was to determine the health literacy and medication administration knowledge of unlicensed health care workers such as certified nursing assistants and non-certified caregivers working in assisted living facilities in Minnesota. Currently, there is a lack of research about both the health literacy and medication administration knowledge of unlicensed health care workers. Unlicensed health care workers in assisted living facilities provide healthcare assistance to the elderly and may provide services such as medication administration, blood glucose monitoring, and assistance with activities of daily living. This research utilized the Newest Vital Sign (NVS) assessment to determine the health literacy of unlicensed health care workers and a novel medication administration test to determine knowledge. This study determined that CNA's have a significantly higher health literacy than non-CNA's however, this did not correlate to having higher medication administration knowledge. The importance of this research is demonstrated by the consequences that a low health literacy or medication administration knowledge of an unlicensed health care worker can have to the care of an elderly person in an assisted living facility. This research could directly impact how facilities train unlicensed health care workers and identify what importance health literacy has on the training of unlicensed health care workers.

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Chapter 1: Introduction

Introduction

Chapter one introduces the readers to a background on health literacy and the consequences associated with the lack of health literacy in the United States. This chapter will examine the problem associated with health literacy in Assisted Living settings and medication administration. The purpose and significance of the study will be discussed. Limitations to the current research study will be acknowledged and relevant terms will be defined for further clarification.

Background to the Problem

A patient's health outcome is widely thought to be dependent on the expertise of the healthcare team however; the health literacy of the patient is vital for successful health outcomes (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Patients that have a low health literacy have been shown to have higher medical costs and use services that are not needed, which creates unnecessary medical spending (Howard, Gazmararian, & Parker, 2005). Not only does health literacy increase medical costs for patients, it also impacts the economy. Research has demonstrated that low health literacy costs the United States between $106 and $238 billion annually (Vernon, Trujilo, Rosenbaum & DeBuono, 2007). Due to the large financial impact of health literacy, research on the topic has been expanding, and many researchers are examining the health literacy of different populations and the effects on an individual's health (Paasche-Orlow, Wilson, & McCormack, 2010).

In the United States only 12% of adults have a proficient health literacy as determined by National Assessment of Adult Literacy (NAAL) (Kutner, Greenberg, Jin, & Paulson, 2006). While health literacy is certainly an issue in the general population, the elderly often have lower

health literacy levels when compared to other age groups (Kutner et al, 2006). Of adults 65 years or older, only 3% have a proficient health literacy (Kutner et al., 2006). Health literacy is of utmost importance, especially with the elderly, since poor health literacy is associated with worse health outcomes including poor chronic disease management, increased hospitalization rates, and decreased preventative care use (Williams, Baker, Parker, & Nurss, 1998; Wolf, Gazmararian, & Baker, 2005). One of the many serious consequences of low health literacy in the elderly is the higher risk of death from all causes and a higher incidence of cardiovascular disease (Baker et al., 2007).

Evidence is clear that much of the elderly population lacks an understanding of their own health and are at risk for poorer health outcomes when compared to their health literacy proficient counterparts (Baker et al, 2007). However, in many cases the elderly are not responsible for their own health care regimens, therefore their care is out of their control (Hawes, Phillips, Rose, Holan, & Sherman, 2003). Many elderly people choose to live in assisted living facilities where they can receive assistance with activities of daily living, such as grooming, toileting, and medication administration. In these situations often an unlicensed health care worker such as a certified nursing assistant (CNA) or a non-certified caregiver administers medications and provides other services while a registered nurse (RN) oversees the patient's care. The elderly that decide to live in assisted living facilities and receive help from unlicensed health care workers rely and trust that they are well trained and qualified to give them this care. Unfortunately, some of these unlicensed health care workers may not have the appropriate health literacy to provide the elderly patients with the best care.

Non-certified, non-familial healthcare workers have been shown in a previous study to have a limited health literacy 35.7% of the time and make medication administration errors

60.2% of the time (Lindquist, Jain, Tam, Martin, & Baker, 2011). Certified nursing assistants in Minnesota undergo a formal skills and written evaluation to become registered, however that training does not include medication administration skills (Nursing assistant registry, 2012). In MN one does not need to be a CNA to work with seniors in an assisted living setting. An Non-certified caregiver is a term that includes non-CNA healthcare workers who undergo no formal training. The non certified health care workers receive on the job training from their employer and can work in the same capacity as CNA's, depending on facility policy.

Medication administration is a vital skill that is often delegated from the RN to the CNA or non-certified caregiver in assisted living facilities. Studies have shown that CNAs make medication administration errors 42% of the time in an assisted living setting (Zimmerman et al., 2011). These medication errors had a moderate to high risk of producing harm 7% of the time (Zimmerman et al., 2011). Medication errors can have dire effects on the health of the elderly and proper training of unlicensed health care workers is of the utmost importance.

Currently, there is no evidence that a limited health literacy is correlated to a higher incidence of medication administration errors. This study proposes not only measuring unlicensed health care workers' health literacy levels but relating the health care literacy levels to their medication administration knowledge level. The information regarding unlicensed health care workers health literacy and knowledge level will not only improve training programs but also the care of residents in assisted living facilities.

Problem Statement

Previous studies have demonstrated that health literacy is an issue in society (Kutner et al., 2006). Studies have demonstrated that patients of all ages, ethnicities, and gender have difficulties with understanding health information (Kutner et al., 2006). However, few studies

have examined the health literacy of unlicensed health care workers. The studies that have examined the health literacy of caregivers have focused on unlicensed health care workers working in seniors' homes or caregivers of children (Lindquist et al., 2011; Sanders, Federico, Klass, Abrams, & Dreyer, 2009). Currently, an insufficient amount of information is known about the health literacy of unlicensed health care workers working in assisted living facilities (Lindquist et al., 2011). In order to provide better training for those working with the elderly and thus better care for the elderly, the health literacy of CNAs and non-certified caregivers must be determined.

Purpose

The purpose of this study is to determine the health literacy of CNAs and non-certified caregivers working with the elderly in assisted living facilities and to determine if that health literacy is correlated to medication administration knowledge. The population of this study will be CNAs and non-certified caregivers working in Elim Care owned assisted living facilities in Minnesota.

Research Question

The question that will be answered from this study is: What is the health literacy of unlicensed health care workers in assisted living facilities and is that health literacy correlated to medication administration knowledge?

Significance of the Study

Studies have clearly demonstrated that a limited health literacy is associated with a barrage of poor health outcomes (Mõttus et al., 2014; Lindquist et al., 2011; Zimmerman et al., 2011). However, not many studies have determined the health literacy of unlicensed health care workers such as CNAs and non-certified caregivers. Previously, studies have demonstrated that

non-certified healthcare workers often have a limited health literacy and make medication administration errors 60.2% of the time (Lindquist et al., 2011). Other studies have demonstrated that trained staff such as CNAs make medication errors 42% of the time in an assisted living setting (Zimmerman et al., 2011). However, no previous research has studied the correlation between health literacy and medication administration knowledge of CNAs and certified caregivers working in an assisted living facility. The knowledge gained from this study would allow for knowledge gaps in unlicensed health care workers training to be identified and benefit elderly living in assisted living facilities.

Limitations of the Study

The researchers acknowledge multiple limitations with the research design. The study will be completed at one long term care organization. This means that all of the healthcare workers will be trained using the same materials. While this allows for the researches to control for variation in training of workers, it also means that this study may not be applicable to all unlicensed health care workers working in assisted living facilities. The study will also be administered by the facilities registered nurses (RNs). While the researchers will provide training for the RNs on how to administer the surveys there may be variations between the RNs delivery methods. Lastly, the researchers are creating a novel medication administration test. The questions on the test may have an unintentional bias and it may not be completely representative of medication administration knowledge. The researchers acknowledge that this survey will not be validified prior to beginning the research and this study will serve to validify the novel instrument.

Definition of Terms

In the context of this research the following terms will be described as followed:

Health literacy is the ability for a patient to read, comprehend, and utilize health information (Nielsen-Bohlman, Panzer, & Kindig, 2004). Health literacy is important in all aspects of care including medication management, chronic disease management, pre and post-operative care, and making beneficial health related decisions.

An assisted living is as defined by Minnesota statute 144G.03. These requirements include assisted livings having a Class A or F home care license, providing assistance with medication administration, and providing assistance with at least three activities of daily living (2015 Minnesota Statutes).

An unlicensed health care worker in terms of this research refers to either a certified nursing assistant or a worker with no formal certification.

A certified nursing assistant is a healthcare worker who has completed formal training and testing requirements as required by the state of Minnesota.

A non-certified caregiver is not a term defined by the state or by facilities but rather a term the researchers have assigned for simplicity. In terms of the research, a non-certified caregiver is an unlicensed health care worker who is not a certified nursing assistant (CNA) but still works in the same capacity.

Chapter 2: Literature Review

Introduction

The prevalence of limited health literacy is a major concern in the United States and patients with a low health literacy can impact many aspects of the healthcare system (Kutner, Greenburg, Jin, & Paulsen, 2006). In the past, literature has thoroughly examined the prevalence of a limited health literacy in various patient populations and health outcomes related to a limited health literacy (Baker, Wolf, Feinglass, Thompson, Gazmararian, & Huang, 2007; Mõttus, Johnson, Murray, Wolf, Starr, & Deary 2014). However, little research emphasis has been placed on determining the health literacy of unlicensed health care workers. In this study, the health literacy of unlicensed health care workers such as certified nursing assistants (CNAs) and non-certified caregivers will be studied to determine if there is a relationship between health literacy and medication administration knowledge. For this research to be successful, an in depth review on the topics of health literacy in the elderly, CNAs, non-certified caregivers, assisted living facilities, and health literacy assessment tools was completed and is presented in this chapter.

Health Literacy

With the release of the National Adult Literacy Survey results in the early 1990's it was discovered that there was a profound lack of literacy in the United States population (Kirsch, 1993). Based off of this survey it was shown that between 40 and 44 million Americans performed on the lowest literacy level, as determined by the survey, and therefore it was deemed necessary to study the different areas of literacy including health literacy (Kutner et al., 2006). Thus since the early 1990s there have been studies that specifically research health literacy and the consequences that low health literacy has, not only the population's health, but also other

negative consequences such as higher medical bills and increased unnecessary medical visits (Cho, Lee, Arozullah, & Crittenden, 2008; Howard, Gazmararian, & Parker, 2005).

The 2003 National Assessment of Adult Literacy examined the literacy of Americans and used this assessment to determine the health literacy of American adults. From this assessment it was shown that 14% of the general adult population had below basic health literacy with a higher amount of males than females scoring with below basic health literacy (Kutner et al., 2006). These 2003 results also showed that race and ethnicity was a determining factor in health literacy. White and Asian/ Pacific Islander adults had a higher health literacy score than Black, Hispanic, American Indian/ Alaska native and multiracial adults (Kutner et al., 2006).

Along with race and ethnicity, education levels have been associated with health literacy. A recent study conducted by Mõttus, Johnson, Murray, Wolf, Starr, & Deary (2014) demonstrated that an older adult's cognitive abilities, which can be a direct influence of a person's education levels, are associated with health literacy and ultimately health outcomes. In this study 730 community dwelling older adults were studied. For this study physical fitness, body mass index, and count of natural teeth were used to determine health outcomes. Health literacy in this study was measured with three different tests including the Rapid Estimate of Adult Literacy in Medicine (REALM), Shortened Test of Functional Health Literacy in Adults (S-TOFHLA), and the Newest Vital Sign (NVS). This study demonstrated that the participants that scored lower on the health literacy tests also had lower health outcomes, including lower physical fitness, height body mass index and less natural teeth. From this study it was determined that lower health literacy resulted in lower health outcomes and lower health literacy was also correlated to lower education level, lower cognitive level, and lower occupational level. This study concluded that an elderly person's education level was a main indicator of measured

health literacy (Mõttus et al., 2014)

Although education levels have been shown to affect health literacy, a study by Baker, Wolf, Feinglass, Thompson, Gazmararian, & Huang (2007) states that an individual's amount of schooling is not directly associated with mortality. Rather reading fluency and lifelong learning are stronger predictors because this accounts for age-related decline. This study involved 3260 medicare managed care enrollees that were interviewed in 1997. Each of the participants completed an interview that consisted of demographic information, chronic illnesses, self reported mental and physical health and their health behaviors. Each participant also completed the shortened version of the Test of Functional Health Literacy in Adults (S-TOFHLA). Health literacy was measured with the S-TOFHLA using reading fluency. Those with an inadequate health literacy had a higher incidence of mortality. This was also true after adjusting for covariates including sociodemographic characteristics, chronic conditions and baseline physical and mental health (Baker et al., 2007).

Health Literacy and the Elderly

One of the most concerning statistics arising from the 2003 National Assessment of Adult Literacy states that adults aged 65 or older had a lower average health literacy than younger adults (Kutner et al., 2006). According to previous research it has been shown that 81.3% of English-speaking adults ages 60 and older have an inadequate health literacy (Williams, Parker, Baker, Parikh, Pitkin, Coates, & Nurss, 1995). This is an area of concern because previous research has shown that as many as 88% of the elderly have at least one chronic illness compared to 45% of the general population (Hoffman, Rice, & Sung, 1996). The previous research demonstrates that the population with the lowest health literacy is also the population that reports the most chronic illnesses (Hoffman et al., 1996).

Gazmararian, Williams, Peel, & Baker (2003) studied the relationship between a Medicare managed care populations' health literacy and their knowledge of their chronic illness (Gazmararian, Williams, Peel, & Baker, 2003). For this study they used the short test of functional health literacy (S-TOFHLA) and questions to determine knowledge of diseases of 653 new Medicare enrollees aged 65 years or older with at least one chronic illness. This study determined that 36% of the population they studied had inadequate or marginal health literacy and those with inadequate health literacy were not aware of important information about their own chronic illnesses (Gazmararian, Williams, Peel, & Baker, 2003).

Health literacy and chronic illness is concerning but health literacy also affects mortality (Sudore et al, 2006). The prospective study conducted by Sudore et. al., (2006) examined 2,512 community dwelling elders (mean age 75.6) from 1999-2004 who were from the Health, Aging and Body Composition study, which began in 1997 and consisted of 3,075 Medicare-eligible men and women ages 70-79 (Harris, Visser, Everhart, et al. 2000). During this study health literacy was determined from the Rapid Estimate of Adult Literacy in Medicine. It was discovered that those found to have limited health literacy had a 2-fold increased risk of death compared to a population with adequate health literacy (Sudore et. al, 2006). This same study also determined that lower health literacy resulted in a higher incidence of chronic illnesses such as hypertension and diabetes and an overall decrease in access to healthcare (Sudore et al, 2006).

Wolf, Gazmararian, & Baker (2005) surveyed new Medicare managed care enrollees, age 65 and older with one chronic illness or more, and utilized the short version of the Test of Functional Health Literacy in Adults. This study determined that those with inadequate health literacy self- reported lower physical and mental health functioning (Wolf, Gazmararian, & Baker, 2005). In addition, the participants in this study with inadequate health literacy also

reported greater limitations in their daily activities which in turn decreased the quality of life of the affected (Wolf, Gazmararian, & Baker, 2005).

One of the obvious benefits of an elderly person having an adequate health literacy is that they improve the outcomes of their chronic illnesses and ultimately decrease mortality from their chronic illnesses (Baker, et al., 2007). Having a lower health literacy not only increases mortality but it also increases morbidity in the elderly (Mõttus, et al, 2014). This has been shown in the study by Mõttus, et al., (2014) which demonstrated that lower health literacies are associated with poorer health outcomes including higher BMIs, lower physical fitness and a decrease in natural teeth.

The study conducted by Baker, Wolf, Feinglass, Thompson, Gazmararian, & Huang (2007) concluded that mortality is associated with comprehension and cognitive abilities of the elderly (Baker et al., 2007). This study demonstrated that an elderly patient often uses their memory to recall what a health care provider has told them and if the patient has low cognitive abilities the patient will have worse outcomes (Baker et al., 2007).

Health Literacy and Nursing Assistants

Often the care of loved ones is entrusted to paid non-familial healthcare workers such as CNAs. In 2013 approximately 8 million people received care from one of the 5 recognized long term care services which includes nursing homes, hospice, home health agencies, adult day services, and residential care facilities (Centers for Disease Control and Prevention, 2013). It is estimated by 2050, 27 million people will need long term care services (U.S. Department of Health and Human Services, 2003).

Lindquist, Jain, Tam, Martin, and Baker (2011) studied 98 paid non-familial healthcare workers (mean age of 49.5) caring for the elderly in a home care setting who were recruited at

physician offices, caregiver agencies, senior shopping areas and independent living facilities. The health care workers' health literacy was assessed with the Test for Functional Health Literacy (TOFHLA) as well as their medication administration skills. It was demonstrated that over one third of healthcare workers of the elderly had an inadequate health literacy. More so, 60.2% of these healthcare workers made medication administration errors while following directions on a label (Lindquist et al., 2011). This is one of the only studies that currently can be found that examines health literacy and medication accuracy of paid health care workers in an elderly home care setting. This study was not completed with CNAs as participants but rather non-certified healthcare workers. There has been no research concerning the health literacy of CNAs and medication administration knowledge.

Nursing Assistant Training in Minnesota

In the United States there are federal regulations regarding the training of nursing assistants and Minnesota offers 3 different pathways to meet those regulations (Wendt, 2010). Potential CNA's can receive their training through a Minnesota State College and University (MNSCU) or Red Cross program which is at least 75 hours in length. Of those 75 hours, 16 must be hands-on training in a nursing home. The other option is to receive training through a high school program affiliated with the Health Care Core Curriculum/Skills set (Wendt, 2010). This training must be at least 128 hours and include 24 hours of clinical training in a nursing home (Wendt, 2010).

Once a person has completed a state approved nursing assistant training program they are eligible to take the National Nurse Aide Assessment Program (NNAAP) (Wendt, 2010). The exam consists of a written and skills examination and the Minnesota Department of Health (MDH) establishes the content of the exam as well as what is a passing score (National Nurse

Aide Assessment Program, 2014). The written portion contains questions regarding all areas of a CNA's training including; physical care skills (activities of daily living, basic nursing skills, and restorative skills), psychosocial care skills (emotional and spiritual), and role of the nurses aid (communication, client's rights, legal behavior, and care team role) (National Nurse Aide Assessment Program, 2014).

The skills examination consists of five skills. One of the skills is handwashing and the remaining four are randomly selected with at least one of the skills being a recording skill (National Nurse Aide Assessment Program, 2014). Recording skills include blood pressure, pulse, respirations, weight, or urine output. Other skills include: putting on a compression sock, ambulation assist with a transfer belt, assists with bedpan, cleans dentures, donning personal protective equipment (PPE), dressing client with affected arm, feeding, modified bed bath, passive range of motion, positioning, catheter care, foot care, mouth care, perineal care, and wheelchair transfer (National Nurse Aide Assessment Program, 2014). A prospective CNA must receive a satisfactory score on all 5 skills in order to pass the skills examination (National Nurse Aide Assessment Program, 2014).

Once the exam is passed, a CNA will remain on the registry for 2 years. In order to renew the CNA certificate the CNA must have worked at least 8 hours providing nursing assistant care in the previous 2 years (Wendt, 2010). Although CNA training in the state of Minnesota provides adequate training on all of the basic CNA skills there is no training on medication administration skills. In Minnesota CNAs have to undergo further training to administer medications which is offered through the CNA's place of employment (Minnesota Statute 4658.1360). According to the statute, at a minimum, medication training must include the procedure of checking a patient's medical record, preparation for medication administration,

administration of the medication, documentation, and reportable events (Minnesota Statute 4658 § 1360).

Assisted Living Facilities and Quality of Life for the Elderly

In 2010 it was estimated that 733,000 persons are residents of assisted living facilities in the United States (Caffrey, Sengupta, Park-Lee, Moss, Rosenoff, & Harris-Kojetin, 2012). In Minnesota the term assisted living is a protected term describing a living facility that provides health care services under a class A or F license (Minnesota Statute 144G § 03). Minnesota requires assisted living facilities to provide assistance with activities of daily living (bathing, dressing, toileting, transferring, and eating) as well as provide either medication assistance or administration (Minnesota Statute 144G § 03).

Quality of life is a vague term that encompasses many different aspects of life and every person can define it differently. According to Kane (2003), in an elderly person, quality of life includes physical functioning, self-maintenance, sexual functioning, psychological well-being, cognitive functioning, comfort, energy, and life satisfaction. Mitchell and Kemp (2000) studied the quality of life of the elderly living in assisted living facilities and found that residents most often have a satisfactory quality of life. The elderly residents tended to be most satisfied with their rooms and the personal care they received (Mitchell & Kemp, 2000).

The quality of life and psychological states of elderly residents is important to consider to provide residents with quality care in all areas including personal cares and medication administration. According to Gruber-Baldini et al. 2004, 13% of elderly residents in assisted living facilities refuse their medications or cares. Staffing can also affect the quality of an assisted living facility. A study by Zimmerman, Sloane, Eckert, Gruber-Baldini, Morgan, Hebel, and Chen (2005) determined that a high RN and LPN turnover was related with a lower quality

of life for the resident.

Medication Administration and Errors

The importance of medication administration cannot be understated in patient care. Medication administration is ubiquitous in all patient care settings from home care to hospitals. When medication administration is present in a facility the risk for a medication error is also present. A medication error is defined as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in control of the health care professional, patient, or consumer" (U.S. Food and Drug Administration, 2015).

Medication errors are a major cause of morbidity and mortality in the United States. According to the Institute of Medicine (IOM) one out of every 131 outpatient deaths and one out of every 854 inpatient deaths is due to a medication error (Nielsen-Bohlman, Panzer, & Kindig, 2004). A study by Barker, Flynn, Pepper, Bates, and Mikeal (2002) found that in 36 facilities (hospitals or skilled nursing facilities) 1 in 5 medication passes had an error. Of those medication errors 7% were potentially harmful to patients. The study researched facilities which had 300 patients on average which equates to more than 40 possibly harmful medication passes a day (Barker et al., 2002).

Many healthcare workers with limited training often have the responsibility of medication administration in home care settings and assisted living facilities. Lindquist et al. (2011), found that inadequate health literacy levels in paid noncertified healthcare workers in a home care setting made significantly more medication errors than those workers with an adequate health literacy. This was demonstrated in a study by Young et al. (2008) that found that the medication error rate in 12 assisted living facilities was 28.2%. The majority of medication errors (70.8%) were due to the medication being administered at the wrong time

(Young et al., 2008). Studies have clearly demonstrated that medication errors occur frequently and that they can often cause negative outcomes (Young et al., 2008; Barker et al., 2002; Nielsen-Bohlman, Panzer, & Kindig, 2004) . However, no study has looked for the effects of a limited health literacy on the medication administration knowledge of the CNA.

Measurement of Health Literacy

In order to assess a patient's health literacy there are a variety of tools available and there are many aspects that are included in measurement tools to quantify health literacy. These include reading fluency, vocabulary, numerical abilities, the ability to understand written health information, and the ability to orally communicate about health (Baker et al., 2007). A comprehensive measure of health literacy is considered to be an assessment that encompasses all of the above listed aspects of health literacy (Baker et al., 2007). There are 43 different health literacy assessment tools that have been utilized in published research (Duell, Wright, Renzaho & Bhattacharya, 2015). The two most commonly used measurement tools are the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA) (Baker, 1999; Davis et. al, 1993). Both of these tests measure criteria that have been demonstrated to be markers for health literacy. However, neither is a comprehensive exam of one's ability.

The REALM assessment is a very brief tool that is best utilized in a medical setting to quickly identify patients with a low health literacy (Bass, Wilson, & Griffith, 2003). It functions as a word recognition test and can be administered in less than 2 minutes (Agency for Healthcare Research and Quality, 2013). It requires participants to pronounce common medical words and the score is calculated based on how many words the participant pronounces correctly (Agency for Healthcare Research and Quality, 2013). Although the REALM assessment does not assess

all aspects of health literacy as described by Baker et al in 2007, studies have suggested that the REALM may be a superior tool to use in populations with a limited health literacy. According to Bass, Wolak, Rovito, and Gordon (2010) The REALM assessment is less threatening to the participant and there is less confusion from the participant of what is expected of them.

The TOFHLA is most often used in health literacy research however, it has a relatively long administration time of 18-22 minutes (Woodwell & Cherry, 2004). There is a short version of the test (S-TOFHLA), which takes 7-10 minutes to administer. In an analysis of every published study that measured health literacy the S-TOFHLA was used to most often. However, there is a prose only version which was used at least 71.4% of the time (Duell et al., 2015). The prose only version does not have a section to measure quantitative abilities and thus results may not provide the full picture of a person's health literacy.

The TOFHLA and the S-TOFHLA are both available in English and Spanish. There are two sections included in the traditional TOFHLA. In the first section the participant answers questions about health related scenarios while in the second the participants fill in the blanks of a text about a medical topic. REALM has the advantage of being quick to administer (under 3 minutes), however, REALM is not available in Spanish (Baker et al., 1999).

Few studies have compared REALM against numeracy assessments and those that have found that REALM overestimated the amount of people with adequate health literacy than the numerical instrument (Duell et al., 2015). However, of the five papers that have adequate data to compare S-TOFHLA and REALM each found that the S-TOFHLA gave a higher estimation of adequate health literacy (Duell et al., 2015)

The Newest Vital Sign (NVS) is a newer health literacy assessment tool that was created in 2005. The test takes 3 minutes to administer and is available in both English and Spanish

(Weiss et al., 2005). Out of the 43 assessment tools that Duell et al. studied, the NVS was the only tool that is suitable for English speakers, is not a self assessment, includes a numeracy and prose component, takes less than 5 minutes, measures more than one health domain, and is a generic tool. Although a quick administration time is important when choosing an assessment tool it can have it's disadvantages. For example, it has been shown that if an assessment tool does not have a time limit then the population being studied generally obtains higher health literacy levels (Robinson, Moser, & Pelter, 2011).

Although the TOFHLA, REALM, and NVS are exceedingly popular they are not comprehensive health literacy assessments and are best used to rapidly assess a level of health literacy (Nutbeam, 2009). Recently, a more comprehensive health literacy assessment has been created called the US Health Literacy Assessment Scale (HALS). This tool assesses five different domains related to health literacy including health promotion, health protection, disease prevention, health care and maintenance, and system navigation (Nutbeam, 2009). The HALS assessment contains 191 tasks, which assess skills such as reading and prose, understanding and using documents, and using quantitative skills (Rudd, Kirsch, & Yamamoto, 2004). When choosing a health literacy assessment it is important to consider all assessment options and which is the most fitting for the study being completed.

Conclusion

The topic of health literacy has been thoroughly researched regarding prevalence and health outcomes. There has been research regarding the health literacy of parents and the health outcomes of their child but there has been limited research on the health literacy of paid, non-familial healthcare workers. The only such study researched non-certified paid healthcare workers that work out of an elder's home providing assistance with activities of daily living.

Currently, there is a gap in research knowledge regarding the health literacy of CNAs and non-certified caregivers and its correlation to medication administration knowledge.

Chapter 3: Methodology

Introduction

The purpose of this study is to determine the health literacy of unlicensed health care workers (certified nursing assistants and non-certified caregivers) working with the elderly and to determine if that health literacy is correlated to medication administration knowledge. The question that will be answered from this study is: What is the health literacy of unlicensed health care workers in assisted living facilities and is that health literacy correlated to medication administration knowledge?

In this methodology section the researchers will discuss the study design, the population, data collection and statistical analysis that will be used to examine the results of the study. This section will also address the validity, reliability and limitations of the present study.

Study Design

The researchers first were given permission to conduct research at the long term care facility in the Upper Midwest (Appendix A). The researchers obtained this consent to perform research at assisted living facilities in the upper Midwest. The assisted living facilities surveyed were located in 5 different cities in the upper Midwest. The participants were informed about what the study is, why the study is being completed, and why they were asked to participate. Each participant had the option to not participate in the study and were assured that there would be no negative consequences through their place of employment. The study was completed by using two different instruments after receiving informed consent from the participants (Appendix B). The registered nurses (RN) and licensed practical nurses (LPN) were given instructions on how to assist in the research (Appendix C). The participants were given a written survey that consisted of demographic information and a medication administration test (Appendix D). This

survey was designed by utilizing the medication administration study materials prepared by the long term care organization participating in this study. This tool also included a short demographic section inquiring about gender and if the participant is a certified nursing assistant or a non-certified healthcare worker. The second instrument is the health literacy assessment tool, The Newest Vital Sign (NVS), first consisted of a nutrition label (Appendix E) and also contained a NVS question sheet where the participants read the questions to themselves. By the original design of the NVS, these questions would have been read out loud by the researcher (Appendix F), however, this method of administering the NVS was modified due to convenience for the employees at the long term facility. The participants recorded their answers to the questions on the NVS answer sheet (Appendix G). Both the medication administration exam and the NVS provided the researchers with a score. The researchers then determined if there was a statistically significant correlation between health literacy and medication administration knowledge as well as any relationship between different demographic information and scores on either exam. The statistical software Microsoft Excel was utilized to calculate the correlation between the values.

These instruments were in a survey style and were utilized in order to allow the participants to complete the research instruments in a timely matter as the participants completed the study at their place of work. The instruments were distributed by the registered nurses (RNs) and licensed practical nurses (LPNs) working in the facilities and participants were pulled aside during their paid work shift in order to complete the instruments in a timely and efficient manner. The research instruments were available at the facilities for a three month period to ensure a large sample size is obtained. After the collection period ended the instruments were collected and the answer keys were used to determine the scores for the participants. First the

answer key was used for the NVS (Appendix G) and then the medication administration test (Appendix H).

The results of the research instruments are confidential and the researchers did not collect any identifying information therefore further protecting the participant's confidentiality.

Population

The population for this study included unlicensed health care workers (certified nursing assistants and non-certified caregivers) working in assisted living facilities in the upper Midwest operated by a long term care organization. All participants voluntarily completed this study and there were no negative consequences on employment for refusal of completion. To be included in the study, the participants had to speak English fluently as the surveys were created and intended to be completed by a fluent English speaking person and there is no adjustment in place for a non-fluent English speaker. The participants also needed to be 18 years of age or older. Any person under 18 was not allowed to participate in this survey as they would need a parent to provide informed consent. In order to obtain statistically significant results the amount of unlicensed health care workers needed to participate was at least 30, however only 16 surveys were collected and analyzed for this study.

Data Collection

In order to collect the data, packets containing an informed consent form, the Newest Vital Sign answer sheet and the medication administration test were sent to the facilities. Along with the packets, several copies of the NVS nutrition label and nurse instructions were also sent. These research instruments were available to the facilities for a three month period and RNs and LPNs administered the instruments to participants as time allowed.

Upon receiving the survey packets, participants first completed the written test which included

demographic information and a medication administration test. Demographic information included the following; sex and if the participant is a CNA or a non-certified caregiver. These demographic questions were chosen due to their relevance to the research question and to account for variables in the research. The demographic information was designed and expected to take less than 1 minute to complete.

The participants then moved on to the written medication administration test. The medication administration test consisted of 10 questions that were read by the participant on paper and completed by writing an answer on paper, there was no verbal component to this test. The medication administration test questions were influenced by the medication administration training materials provided by the long term care organization. The medication administration test was created by the researchers and it was reviewed by a team of 3 registered nurses from the facility utilized. The medication administration exam was designed and expected to take less than 10 minutes to complete. Participants' medication administration scores were out of a total of ten points.

The participants then moved on to complete the health literacy assessment. The Newest Vital Sign (NVS) is composed of 6 questions pertaining to a nutrition label. The participants read the questions provided while referring to the nutrition label and then wrote their answer on the answer sheet provided. Originally the NVS was designed to be taken verbally where an administrator would read the questions and the participant would write down their answers but this was altered as described at the beginning of this section. The participants were not allowed to write down anything else but the answer. The NVS was designed and expected to take less than 3 minutes to administer. In order to keep responses confidential, both the written survey and the NVS results were numbered. Each participant arbitrarily received a number that was

recorded on both their written and NVS survey. This number was not associated with the participant's name and the researchers did not know any participants' names.

Instrument Selection

For the current study the researchers used the NVS which was designed to be a quick and accurate test to screen for health literacy in primary health care settings and is available for all providers for free (Weiss et al., 2005). This instrument was created by giving 1,000 patients health related information and evaluating the patient's ability to answer questions based off of different scenarios in regards to the given information (Weiss et al., 2005).

The original scenarios were developed by a panel of health literacy experts and were based off of concepts used in health literacy as well as general literacy (Weiss et al., 2005). After the initial administration the scenarios were modified based off of the feedback received from the patients, interviews and data analysis which focused on the scoring of the NVS (Weiss et al., 2005).

Based off of this feedback 5 scenarios were established and were tested. The scenarios were the following: (1) instructions from a prescription for headache medications, (2) a consent form for a coronary angiography, (3) heart failure self- care instructions, (4) a nutrition label from an ice cream container, and (5) instructions for asthma medication that included tapering steroid dose (Weiss et al., 2005). The scenarios looked at literacy skills that are essential for understanding health literacy. Each of the scenarios were accompanied by 3-6 questions, which created a 21 question pool that was administered to 500 participants (250 English speakers and 250 Spanish speakers) (Weiss et al., 2005). Based off of the data analysis the ice cream nutrition label was chosen to be used because this scenario was found to have the highest reliability and validity out of the 5 scenarios (Weiss et al., 2005).

After this research the scenario for the NVS was chosen to be reading off of a ice cream nutrition label due to the inclusion of both reading and numeracy skills involved in the research tool (Weiss et al., 2005). Including both reading and numeracy skills was essential because the patient needs to be proficient both text and numbers in order to be successful in today's health care system (Weiss et al., 2005).

The research study that evaluated the NVS used the TOFHLA for a comparison since the TOFHLA is the most widely used health literacy tool in research (Weiss et al., 2005) Out of the 500 participants, the participants were divided into even-numbered participants or odd-numbered participants and the NVS questions were given to the even-numbered first and the TOFHLA was given to the odd numbered participants first (Weiss et al., 2005)

Based off of the research on the NVS, it was determined that the NVS was reliable and accurate way to measure health literacy and has a high sensitivity for detecting patients with limited literacy (Weiss et al., 2005). The NVS also may be more sensitive than the TOFHLA to marginal health literacy (Weiss et al., 2005). However, it was shown that the specificity of the NVS was less than optimal but it is similar to other screening methods used in primary care including screening for alcohol abuse or osteoporosis risks (Weiss et al., 2005).

To interpret the scoring of patients a score greater than 4 is determined to be adequate health literacy as measured by the TOFHLA (Weiss et al., 2005). A score less than 4 on the NVS can be associated with a limited health literacy and a score less than 2 indicates that the patient may be at risk of having a marginal or inadequate literacy (Weiss et al., 2005).

The second instrument that was utilized was a medication administration test. The test consisted of ten multiple choice questions on the following topics: routes of medications, medical abbreviations, rights of medication administration, the medication administration record,

aging and medications, inhaled medications, controlled substances, diabetic medications, and generic medications. The test was created by the researchers by integrating topics from both the long term care organization's medication administration exam and the state guidelines on medication administration by unlicensed personnel. Topics included in the long term care organization's medication administration test included: medical abbreviations, controlled substances, aging and medications, generic medications, systemic and local effects of drugs, patient refusal of medications, medication rights, medication documentation, diabetes, work-related accidents, and antipsychotic medications.

Per Minnesota state statute 4658.1360 the topics needed to be taught by facilities include: using the medication administration record (MAR), preparations of medications, administration of medications, assisting with self-administration of medications, and medication documentation (MN Statute 4658.1360). By integrating topics from both the long term care organization and the state of Minnesota the researchers had an appropriate and comprehensive medication administration test to determine the participant's medication administration knowledge.

Data Analysis

In order to complete data analysis the medication administration test scores, the Newest Vital Sign (NVS) scores, and the demographic information were considered. The first group of data was the participants' scores on the NVS which was a score from 0-6. The second group of data was the participants' scores on the medication administration exam which was a number from 0-10. The final group of data was the two demographic questions posed to the participants; what is your sex and are you a CNA or a non-certified caregiver?

The researchers utilized multiple statistical methods to study the relationships between health literacy, medication administration, and demographics. The first method used was a paired

t- test to determine if there was a statistically significant difference of scores on the medication administration test and on the NVS between CNA and non- CNA caregivers. A multiple (linear) regression was then used to analyze the relationship between health literacy and medication administration knowledge. This was to determine if the scores were correlated and determine if one score could predict the other.

Validity and Reliability

For this study the researchers chose to use the NVS survey for health literacy. This survey instrument has been used in previous studies to measure health literacy and it is considered to be both reliable and valid as discussed in the instrument selection section (Weiss et al., 2005). However since the administration of the NVS was altered from the original administration this may have altered the validity and reliability of the current instrument. The medication administration instrument designed by the researchers did not have any preexisting data on its validity. However, the current research served to validify the instrument.

In order to maintain reliability for this study all of the participants received the same health literacy and demographic survey. The survey and medication administration test were completed the same way for each participant. The participant first filled out the medication administration test and demographic survey and then NVS on paper.

Limitations

Limitations of this study included the administration of the surveys, the facilities the research is being completed in, and the medication administration instrument. The surveys were administered by RNs and LPNs working in the facilities. Each RN or LPN received training on administering the surveys, however, there was still variability in the administration. Also, due to the estimated 15 minute time requirement of this study the facility and the participants resisted

participation in this study and therefore there was a smaller sample size than expected. The researchers acknowledged this and realized that there may be difficulty with the population size and worked with assisted living facilities to recruit participants.

This research was only being completed at one long term care organization so the results gained from this research are not to be applicable to all unlicensed health care workers employed by other organizations. However, since the research was only being completed at specific long term facilities the researchers were able to better control for variations in facility training of unlicensed health care workers.

The NVS was used in this study and is comparable to the full version of the Test of Functional Health Literacy of Adults (TOFHLA). The researchers of the current study chose to utilize the NVS due to the reliability and validity as demonstrated by Weiss et al., 2005 and the ease and time allocation of administering this 6 question health literacy tool.

A few delimitations of the study also exist that the researchers acknowledged. The participants of the study only included unlicensed health care workers employed in an assisted living setting in order to study a population not currently included in literature on health literacy. For the same reason only an assisted living facility in the upper Midwest were included.

Conclusion

Using previous research the current researchers developed a methodology to measure the health literacy of CNAs and non-certified caregivers working in assisted living facilities and to answer the research question, What is the health literacy of unlicensed health care workers in assisted living facilities and is that health literacy correlated to medication administration knowledge? The next two chapters will review the results obtained from the prior methodology and discuss the findings.

Chapter 4: Results

Introduction

Health literacy has an effect on all aspects of healthcare, which was discussed in great detail previously in the introduction and the literature review. This study was designed to analyze the relationship between health literacy and medication administration in certified nursing assistants (CNAs) and non-certified caregivers in assisted living facilities. The data collected from this survey was analyzed to further examine this relationship.

Analysis of Data

Results of the data were analyzed from a total of 16 responses. Of the 16 responses, 9 classified themselves as CNA caregivers and 7 classified themselves as non-CNA caregivers. 100% of the respondents were female. Data was analyzed using Microsoft Excel.

Results of the Newest Vital Sign Instrument

The purpose of the Newest Vital Sign (NVS) was to quickly and effectively determine the health literacy of unlicensed health care workers. The NVS was scored independently by two researchers in order to ensure accurate and reliable results. Correct answers and possible variations of answers were taken directly from the NVS score sheet (Appendix D). Variations of answers not included on the NVS score sheet were not accepted as correct.

The average score of the NVS was 5.125 out of a possible 6 points. Question one had 93% correct responses, question 2 had 75% correct responses, question 3 had 75% correct responses, question four had 68.75% correct responses, and both questions five and six had 100% correct responses (Figure 1). Nine out of the sixteen responses were CNA's and seven responses classified themselves as non-CNA caregivers.

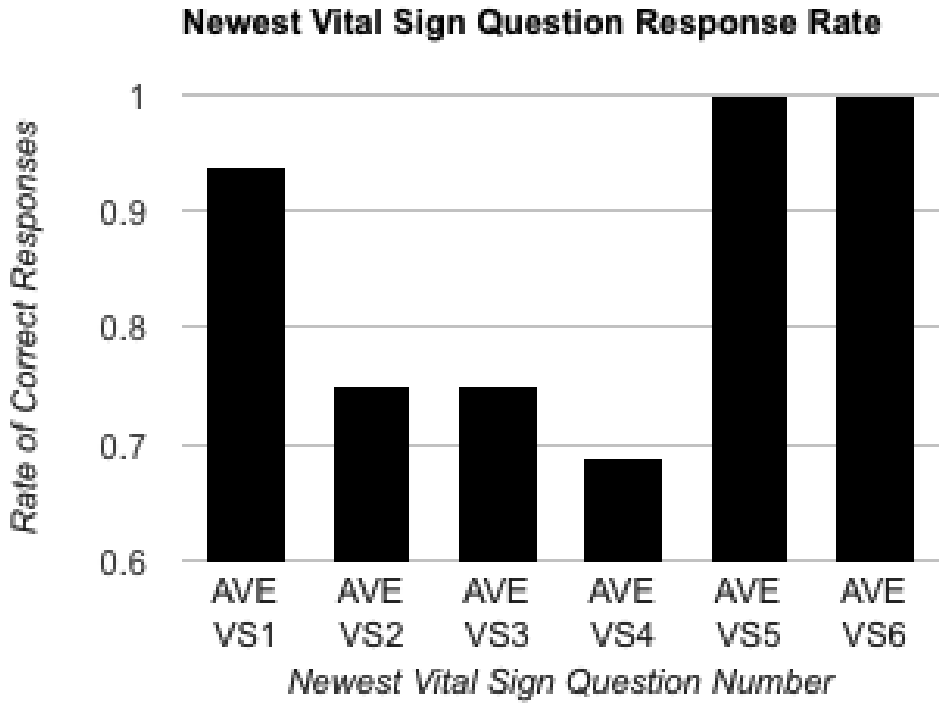

Figure 1. Individual question score averages for the Newest Vital Sign.

Question one's average score for CNA's was 100% and for non-CNA it was 85.7%. Question two's average score for CNA's was 88.8% and for non-CNA it was 57.14%. Question 3's average score for CNA's was 77.7% and for non-CNA's was 55.5%. Question 4's average score for CNA's was 88.8% and for non-CNA's was 42.8%. Question 5 and 6 both had a 100% average score for both CNA and non-CNA's. Each of the average scores for the CNA for non-CNA can be seen below (Figure 2).

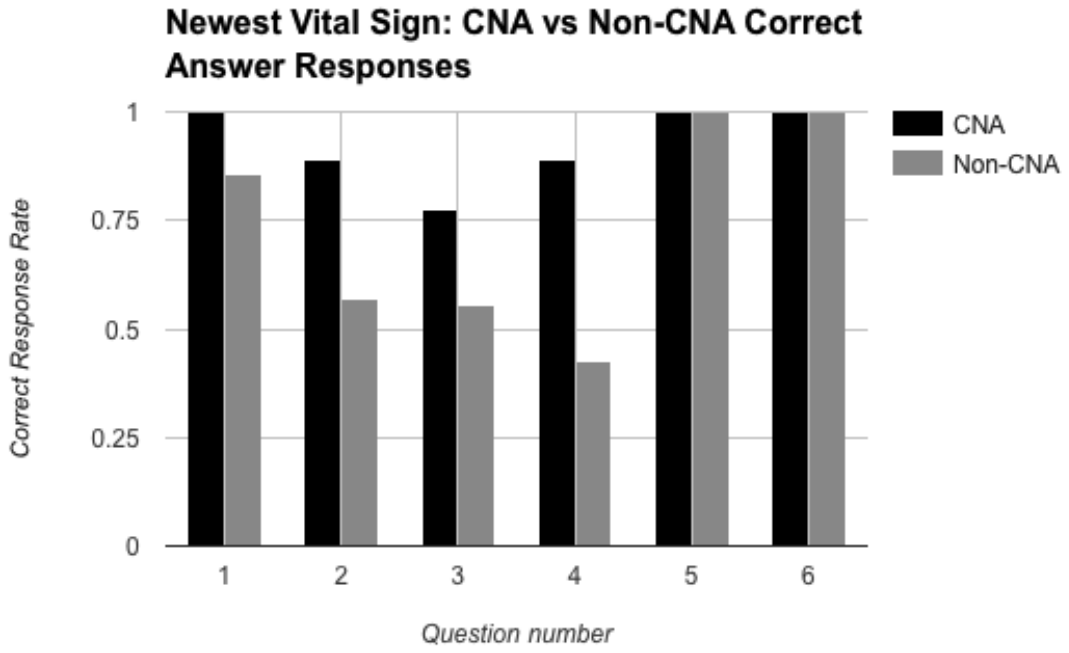

Figure 2. Newest Vital Sign: Comparison of CNA vs Non-CNA Answer Response

The total average score of the NVS for CNA's was 94.33%, for non-CNA caregivers the mean score was 78.43%. Standard deviation of these scores for CNA's was 23% and for non-CNA's was 8.5%. A two-tailed T-test of the scores provided a p-value of 0.075.

Results of the Medication Administration Test

The ten question medication administration test was graded according to the answer key found in appendix C. It was scored independently by two researchers to ensure accurate and reliable scoring. The average medication administration test score for all participants was 75%. Question 1 had a 93.7% correct response rate, Q2 43.7% correct, Q3 100% correct, Q4 62.5%, Q5 56.25% correct, Q6 100% correct, Q7 62.5% correct, Q8 62.5% correct, Q9 87.5% correct, and Q10 87.5% correct (Figure 3). The results were further broken down into CNA vs non-CNA average correct responses.

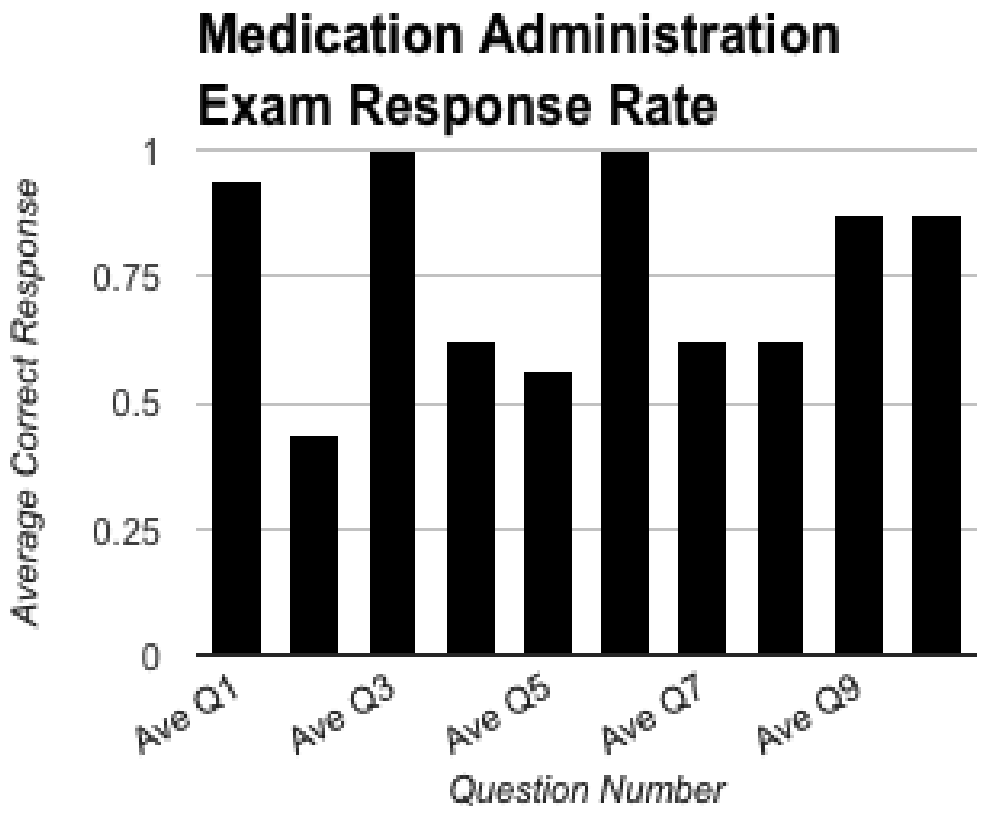

Figure 3. Individual question averages for the medication administration exam

Question one's average score for CNA's was 100% and for non-CNA's was 85.7% Question two's average score for CNA's was 44.4% and for non-CNA's was 42.8%. Question three's average score for both CNA's and non-CNA's was 100%. Question four's average score for CNA's was 55.5% and for non-CNA's was 71.4%. Question five's average score for CNA's was 66.67% and for non-CNA's was 42.8%. Question six average score for CNA's and non-CNA's was 100%. Question seven's average score for CNA's was 66.67% and for non-CNA's was 57.14%. Question eight's average for CNA's was 66.67% and for non-CNA's was 57.14%. Question nine's average score for CNA's 77.8% and for non-CNA's was 85.7%. Question ten's average score for CNA's was 77.7% and for non-CNA's was 100% (Figure 4).

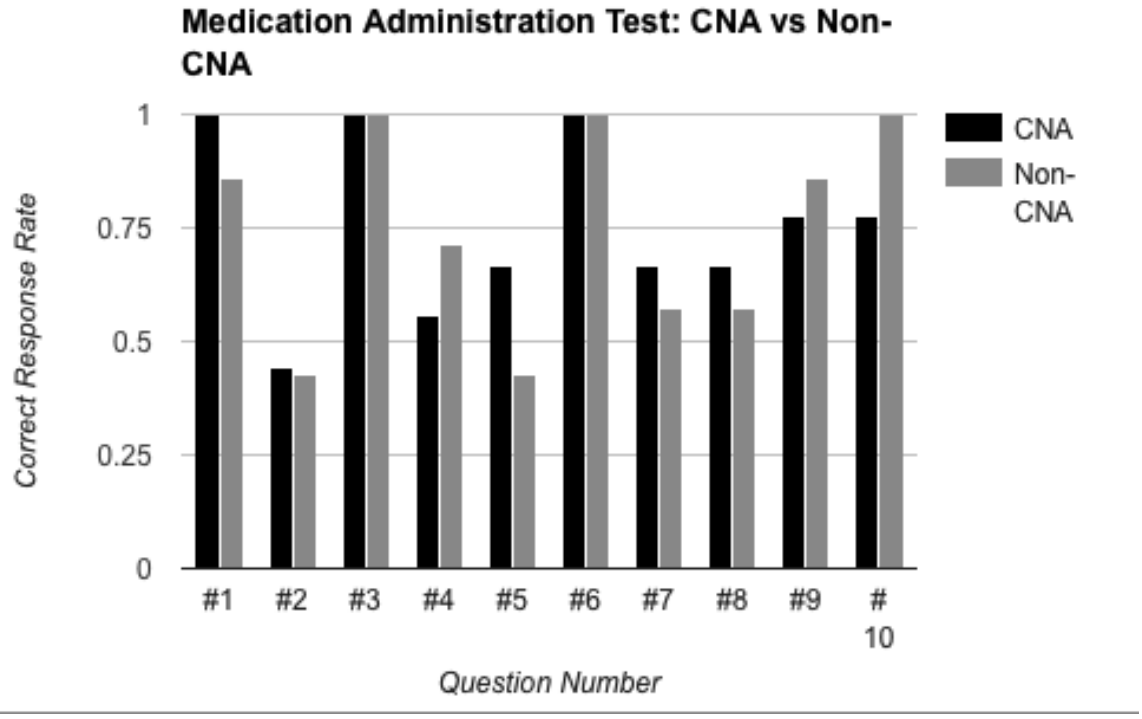

Figure 4. Medication administration test individual question scores for CNA and non-CNA caregivers.

9 CNA's participated in the exam and they had an average score of 75.56%. 7 non-CNA's participated and had an average score of 74.29%. The standard deviation for CNA's was 15.9% and for non-CNA's was 11.34%. Two two tailed P-value was 0.861 and the t-value was 0.1784.

Analyzing the Relationship between Health Literacy and Medication Administration Knowledge

A multiple (linear) regression was completed on the above results of the Newest Vital Sign and Medication Administration Knowledge (Figure 5). The best fit slope of this linear regression was -0.08929 +/- 0.3283. The equation of the line was found to be Y= -.0.08929*X + 90.82

(Figure 5). The R square value of the regression was 0.005255. The P value found for this regression was 0.7896 and the slope was calculated to be not significantly non-zero.

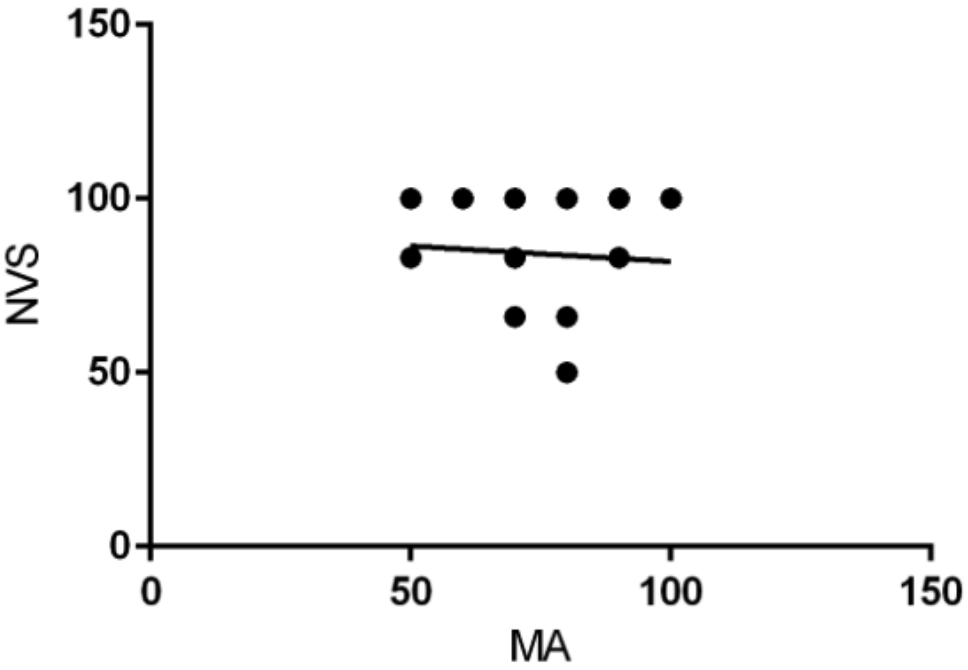

Figure 5. Linear Regression of Relationship Between Health Literacy and Medication Administration Knowledge

Chapter 5: Discussion

Introduction

The results of this study determined the average score of both the Newest Vital Sign and the Medication Administration exam. It was then determined what the average scores were for CNA versus non-CNA caregivers. Finally, a multiple regression was performed to determine the relationship between health literacy and medication administration knowledge. Chapter five will further discuss these results and explore implications of the results.

Discussion of Findings

Newest Vital Sign Findings. The Newest Vital Sign was utilized to determine the health literacy of unlicensed health care workers. The NVS is a reliable and valid test created for patient use. In this study, the NVS was utilized on unlicensed health care workers and the format of the test was adjusted. The test was initially created to be used as a verbal tool that patients would be read questions out loud and patients would respond with their answers verbally. In this study, participants were read questions and wrote down their answers. It was found that certified nursing assistants average score on the NVS was 94.33% and the non-CNA caregivers average score was 78.43%. The p-value associated with these averages was 0.075 which is considered marginally significant in our study ($p < 0.1$) but not highly significant ($p < 0.05$). Although these results are not highly significant, there is a clear distinction between the results of CNA's and non-CNA caregivers. Question four proved to be most difficult for the population as question four was assessing mathematical abilities. Although this is only one aspect of the health literacy exam, it is important to note since the unlicensed health care workers included in this study do administer medications and mathematical knowledge is often imperative for reducing medication errors. Further studies could determine if there is any significance between mathematical abilities

and medication administration errors.

Although CNA caregivers had a better average score on the NVS they also had a larger standard deviation of scores than non-CNA caregivers. This suggests that there is a greater variability in CNA caregivers health literacy than in non-CNA caregivers. However, this large standard deviation may not have been present if there was a larger sample size.

Medication Administration Test Findings. Medication administration knowledge was assessed using a survey instrument created by the researchers. Ten questions were created from materials used to train unlicensed health care workers. The average score on the medication administration test was 75% for all participants. The average score for CNA's was 75.56% and the average score for non-CNA's was 74.29%. This difference was not significant. All of the unlicensed health care workers at the assisted living facilities used in this research receive the same medication administration training from the assisted living facilities and thus it was likely that non CNAs could perform similarly on the medication administration exam as CNAs. This result suggests that the CNA's additional training does not significantly improve their understanding of medication administration. However, this exam tested only route knowledge, it did not assess critical thinking skills that may be necessary when administering medications.

Question two proved to be the most difficult question for both CNA and non-CNA caregivers (average of 44.4% and 42.8% respectively). This question was in regards to common medical abbreviation use. Although common abbreviations are included in the training curriculum for unlicensed health care workers, this suggests that the majority of the workers do not have a solid understanding of the abbreviations. This could result in catastrophic medication errors. There were several questions in which the non-CNA caregivers performed better than the CNA caregivers. This included question seven regarding inhaled medications, question nine

regarding insulin use, and question ten regarding generic drug use. This is an interesting and unexpected finding. The researchers cannot comment on a cause for this finding as it may be due to random variability.

Relating Health Literacy to Medication Administration Knowledge. A multiple regression was performed on the results of the Newest Vital Sign and the medication administration test to determine if there was a relationship between the two results. The slope of the best fit line was found to be essentially zero and the R square value was also found to be essentially zero. This signifies that one's performance on the NVS cannot predict their score on the medication administration test. Therefore, this research found no relationship between one's health literacy (NVS score) and their performance on a medication administration test.

Although CNA's do have a significantly higher health literacy than non-CNA's, this did not benefit them on the medication administration exam. This suggests that the health literacy of an unlicensed health care worker is not a significantly important factor, at least in regards to medication administration. This may be explained by the type of questions on the medication administration test. All of the questions on the exam were questions based on information from the unlicensed health care workers training materials. This means that all of the unlicensed health care workers had been exposed to the material previously and this type of route knowledge may not be indicative of health literacy but rather of memorizing material.

Limitations

There are many possible limitations associated with this study. The foremost limitation is the sample size of the study. Prior to administering the surveys it was estimated that there would be 30 participants however only 16 participants were recruited to participate in the study. Our results also do not have the statistical power to have significant results. Although our small

sample size found that there is no significant difference between CNA and non-CNA caregivers health literacy or medication administration knowledge this may not be true of a larger population. Although our population had a close split between CNA and non-CNA caregivers, we had no males participate in this study. Our study participants were also only chosen from one location in the Upper Midwest region therefore the results are not applicable to any other geographic location.

Another limitation was the testing methods used. The Newest Vital Sign is a valid and reliable test. However, the NVS was designed for use by patients, not by healthcare workers. The researchers also adjusted the testing format of the NVS. Instead of answering questions verbally, participants read and wrote down their answers. This was a necessary adjustment to complete data collection, however, it may have interfered with the true results of the test. The medication administration test was created by the researchers and it was reviewed by a team of 3 registered nurses from the facility being researched. The content of the exam was taken from educational materials used to train the unlicenced health care workers. However, as with any testing instrument created by researchers, it may not accurately reflect the unlicensed health care workers true medication administration knowledge.

Further Research

There are still aspects of the research question that could be addressed in further studies. This research study only included one healthcare organization located in the upper midwest. Therefore, the results may not be applicable to other regions or organizations. Further research involving participants from different organizations would be useful in determining the transferability of the results. Another direction further research could take would be changing the study design. Using a more comprehensive assessment of the health literacy or a practical

exam to assess medication administration knowledge may yield less limited results. It would also be useful to determine an unlicensed health care workers health literacy and then to determine if it is related to health outcomes of residents under their care.

Relation to Past Research

There is a great lack in research on the relationship between health literacy of unlicensed health care workers in long term care facilities. However, one of the past research studies on health literacy has examined the relationship between health literacy and medication administration (Lindquist, Jain, Tam, Martin, & Baker, 2011). This study was described in the literature review and it studied 98 paid non-familial healthcare workers caring for the elderly in a home care setting. It was demonstrated that over one third of healthcare workers of the elderly had an inadequate health literacy (Lindquist et al., 2011). In the current study it was found that certified nursing assistants average score on the NVS was 94.33% and the non-CNA caregivers average score was 78.43%. Based on the NVS these scores correlated to adequate health literacy.

More so, 60.2% of these healthcare workers made medication administration errors while following directions on a label (Lindquist et al., 2011). In the current research study medication errors were not measured but rather medication test scores were assessed. It was found that the average score on the medication administration test was 75% for all participants. The average score for CNA's was 75.56% and the average score for non-CNA's was 74.29%. Although it is difficult to determine how the medication administration test scores would correlate to medication administration errors it is still can be appreciated that medication administration needs improvement in unlicensed health care professionals, including CNAs and non-CNAs.

This study was not completed with CNAs as participants but rather non-certified

healthcare workers. As mentioned previously there has been no research concerning the health literacy of CNAs and medication administration knowledge.

Conclusion

In conclusion, the researchers were able to answer the research question: What is the health literacy of unlicensed health care workers in assisted living facilities and is that health literacy correlated to medication administration knowledge? The research found that CNA caregivers do have a significantly higher health literacy than non-CNA caregivers, however this higher health literacy was not related to higher medication administration scores. This study had significant limitations that may have hindered the results and further research is recommended to better understand these research questions. This study was successful in providing further direction for the research of health literacy in licensed and unlicensed caregivers in assisted living facilities.

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Appendix A

Research Permission From Long Term Facility

Facility Consent for IRB Approval

Perreault, Janet <janet.perreault@elimcare.org> Mon, Mar 21, 2016 at 3:34 PM

To: Kelsey Walczak <kkw54372@bethel.edu>, Lynsey Kissinger <lyk88497@bethel.edu>

Hi,

On behalf of ElimCare inc I am giving consent for Bethel

students Kelsey Walczak and Lynsey Kissinger to

work/study in our assisted living or skilled nursing facilities.

Janet Perreault, RN

3/21/2016

Janet Perreault, RN

Director of Quality Assurance

ElimCare Inc

952-843-3545

Appendix B

Participant Consent Form

You are invited to participate in a study of health literacy and medication administration knowledge of unlicensed caregivers. This study's purpose is to discover the health literacy and medication administration knowledge of unlicensed caregivers. You were selected as a possible participant in this study because you work as an unlicensed caregiver in an Elim Care assisted living facility.

If you decide to participate, you will be asked questions regarding your demographic information, medication administration knowledge, and questions to assess your health literacy. There will be three demographic questions. There will also be ten written questions of medication administration and six verbal questions to assess health literacy. You will have 15 minutes to complete both surveys. The data will be recorded through a written and a verbal component. There are no anticipated risks to completing this study and this study will benefit the training of other unlicensed caregivers as well as the long term care organization.

Any information obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission. In any written reports or publications, no one will be identified or identifiable and only aggregate data will be presented.

Your decision whether or not to participate will not affect your future relations with your current employer in any way. If you decide to participate, you are free to discontinue participation at any time without affecting such relationships.

This research project has been approved by the researcher's research advisor in accordance with Bethel University's Level of Review for Research with Humans. If you have any questions about the research or your rights as a participant or you wish to report a research related injury please call:

-Kelsey Walczak: 612-889-0029
-Lynsey Kissinger:
-Lisa Naser (Research Chair):

By completing and returning the survey, you are granting consent to participate in this research.

Appendix C

Instructions for RN's and LPN's Assisting with Research

HEALTH LITERACY AND MEDICATION ADMINISTRATION KNOWLEDGE OF UNLICENSED HEALTH CARE WORKERS IN ASSISTED LIVING FACILITIES

Instructions for RN's and LPN's assisting with research

Thank you for agreeing to help with our research! We hope that this research will be easy to administer and require little extra effort on your part. The following is a checklist on how to administer the surveys followed by more detailed explanations. These surveys can be administered at any time and during any shift. These surveys are available to all unlicensed health care workers (e.g. CNA's, resident assistants) that work directly with residents providing assistance with ADL's and medication administration. If you have any questions regarding this research or how to administer the surveys please feel free to contact us through the following methods:

Kelsey Walczak: kkw54372@bethel.edu, 612-889-0029
Lynsey Kissinger: lyk88497@bethel.edu, 763-213-6039

Research Checklist:

_____ Hand the participant a research envelope

_____ Ensure that the participant reads and agrees to the informed consent form on the outside of the envelope before beginning the survey

_____ The participant should begin with the written survey first (demographic information and medication administration survey)

_____ Once the participant has finished the written survey administer the Newest Vital Sign to the participant

_____ Once the participant is finished with both surveys ensure that both the written survey and the Newest Vital Sign answer sheet are placed in the envelope by the participant and that the envelope is sealed.

Appendix D

Written Survey

Written Survey
Part I: Demographic Information

1.) Are you 18 years of age or older?
    a.) Yes
    b.) No
2.) What is your sex
    a.) Male
    b.) Female
3.) What is your training background?
    a.) Certified nursing assistant (CNA)
    b.) Non-CNA caregiver

Part II: Medication Administration Test
There are 10 multiple choice questions pertaining ot medication administration. Choose the best answer for the following questions, there is only one correct answer.

1.) You receive an order for Nitroglycerin to be given sublingually. How would it be administered?
    a.) By mouth
    b.) Under the tongue
    c.) Applied to the skin
    d.) Instilled in the ear
2.) A medication is to be given QD PO. What is the most appropriate way to administer this medication?
    a.) Once a day, by mouth
    b.) Four times a day, by mouth
    c.) Once a day, as needed
    d.) Once in the morning and once at night
3.) Which of the following is NOT one of the seven rights of medication administration?
    a.) Right route
    b.) Right time
    c.) Right administration
    d.) Right response
4.) What is a PRN order?
    a.) A one time order
    b.) A medication given on a set schedule
    c.) A medication that is given as needed per physician orders
    d.) A medication that is given per the residents wishes
5.) When should the medication administration record (MAR) be compared to a medication

to be dispensed?

a.) Before and after dispensing a medication
b.) As the medication is prepared, before and after dispensing a medication
c.) As the medication is prepared and after dispensing a medication
d.) As the medication is prepared and before dispensing a medication

6.) Which of the following is one of the four ways that medication effectiveness can be changed as a person ages?

a.) Excretion
b.) Health
c.) Beauty
d.) Symptoms

7.) Which of the following is a **correct** way to administer inhaled medications?

a.) Wait 1 minute between giving two different inhalers
b.) Do not wash out the mouthpiece of the inhaler after every use
c.) Wait 1 minute between giving the first and second puff of the same inhaler
d.) Give the second puff of an inhaler immediately after the first puff

8.) Medications that require special locked storage include:

a.) Over the counter medications
b.) Controlled substances
c.) Ophthalmic agents
d.) All of the above

9.) Mrs. Jones is a diabetic and is scheduled to take insulin around meal times. Which of the following would be an appropriate time to administer her insulin?

a.) One hour before meal times
b.) 30 minutes after meal times
c.) 30 minutes before meal times
d.) In the morning and at night

10.) Which of the following is true regarding generic and brand name drugs?

a.) A generic drug is not as good as a brand name drug
b.) A generic drug is more expensive than a brand name drug
c.) A generic drug is chemically the same as a brand name drug
d.) All of the above

Appendix E

Newest Vital Sign Nutrition Label

Nutrition Facts

Serving Size	½ cup
Servings per container	4

Amount per serving			
Calories	250	Fat Cal	120
			%DV
Total Fat	13g		20%
Sat Fat	9g		40%
Cholesterol	28mg		12%
Sodium	55mg		2%
Total Carbohydrate	30g		12%
Dietary Fiber	2g		
Sugars	23g		
Protein	4g		8%

*Percentage Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Ingredients: Cream, Skim Milk, Liquid Sugar, Water, Egg Yolks, Brown Sugar, Milkfat, Peanut Oil, Sugar, Butter, Salt, Carrageenan, Vanilla Extract.

Appendix F

Newest Vital Sign Question Sheet

Newest Vital Sign Question Sheet

Refer to the Newest Vital Sign nutrition label when reading the following questions. Write your answer on the provided answer sheet.

1.) If you eat the entire container, how many calories will you eat?
2.) If you are allowed to eat 60 grams of carbohydrates as a snack, how much could you eat?
3.) Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?
4.) If you usually eat 2,500 calories in a day, what percentage of your daily value of calories will you be eating in one serving?

Pretend you are allergic to the following substances: penicillin, peanuts, latex gloves, and bee stings

5.) Is it safe for you to eat this ice cream?
6.) Why or why not?

Score Sheet for the Newest Vital Sign
Questions and Answers

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

1. If you eat the entire container, how many calories will you eat?
   Answer: *1,000 is the only correct answer*

2. If you are allowed to eat 60 grams of carbohydrates as a snack, how much ice cream could you have?
   Answer: *Any of the following is correct: 1 cup (or any amount up to 1 cup), half the container. Note: If patient answers "two servings," ask "How much ice cream would that be if you were to measure it into a bowl?"*

3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?
   Answer: *33 is the only correct answer*

4. If you usually eat 2,500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?
   Answer: *10% is the only correct answer*

READ TO SUBJECT:
Pretend that you are allergic to the following substances: penicillin, peanuts, latex gloves, and bee stings.

5. Is it safe for you to eat this ice cream?
   Answer: *No*

6. (Ask only if the patient responds "no" to question 5): Why not?
   Answer: *Because it has peanut oil.*

	ANSWER CORRECT?	
	yes	**no**
1		
2		
3		
4		
5		
6		
Number of correct answers:		

Interpretation

Score of 0-1 suggests high likelihood (50% or more) of limited literacy.
Score of 2-3 indicates the possibility of limited literacy.
Score of 4-6 almost always indicates adequate literacy.

Appendix G

Newest Vital Sign Participant Answer Sheet

NVS Participant Score Sheet

Directions: Using **blue or black ink** please fill in your answer in the appropriate box after you read the question. You may not write anywhere else on this score sheet and you **must only write your answer.**

Question	Answer
#1	
#2	
#3	
#4	
#5	
#6	

Appendix H

Medication Administration Answer Key

1.) You receive an order for Nitroglycerin to be given sublingually. How would it be administered?
    a.) By mouth
    b.) Under the tongue
    c.) Applied to the skin
    d.) Instilled in the ear
2.) A medication is to be given PO QD. What is the most appropriate way to administer this medication?
    a.) Once a day, by mouth
    b.) Four times a day, by mouth
    c.) Once a day, as needed
    d.) Once in the morning and once at night
3.) Which of the following is NOT one of the seven rights of medication administration?
    a.) Right route
    b.) Right time
    c.) Right administration
    d.) Right employee
4.) What is a PRN order?
    a.) A one time order
    b.) A medication given on a set schedule
    c.) A medication that is given as needed per physician orders
    d.) A medication that is given per the residents wishes
5.) When should the medication administration record (MAR) be compared to a medication to be dispensed?
    a.) Before and after dispensing a medication
    b.) As the medication is prepared, before and after dispensing a medication
    c.) As the medication is prepared and after dispensing a medication
    d.) As the medication is prepared and before dispensing a medication
6.) Name a reason that doesn't change medication effectiveness for a person who is elderly.
    a.) Beauty
    b.) Insurance
    c.) Metabolism
    d.) Symptoms
7.) Which of the following is a **correct** way to administer inhaled medications?
    a.) Wait 1 minute between giving two different inhalers
    b.) Do not wash out the mouthpiece of the inhaler after every use
    c.) Wait 1 minute between giving the first and second puff of the same inhaler
    d.) Give the second puff of an inhaler immediately after the first puff
8.) Medications that require special locked storage include:
    a.) Over the counter medications
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    c.) Ophthalmic agents
    d.) All of the above

9.) Mrs. Jones is a diabetic and is scheduled to take insulin around meal times. Which of the following would be an appropriate time to administer her insulin?
    a.) One hour before meal times
    b.) 30 minutes after meal times
    c.) 30 minutes before meal times
    d.) In the morning and at night
10.) Which of the following is true regarding generic and brand name drugs?
    a.) A generic drug is not as good as a brand name drug
    b.) A generic drug is more expensive than a brand name drug
    c.) A generic drug is chemically the same as a brand name drug
    d.) All of the above