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Elderly Patient Adherence to Ocular Pharmaceuticals; Impact of Educational and Physical Barriers

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Elderly Patient Adherence to Ocular Pharmaceuticals; Impact of Educational and Physical Barriers

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Elderly Patient Adherence to Ocular Pharmaceuticals. Impact of Educational and Physical Barriers

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Abstract

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The purpose of this research was to assess and evaluate elderly patient's attitudes and behavior regarding educational and physical barriers and the impact on adherence to ocular pharmaceuticals. A 19 question survey was developed and in order to collect data. The survey was administered in person at the Edina Senior Center and the Burnsville Senior Center and online via Zoomerang survey software regarding elderly patient attitudes on educational and physical barriers and their impact on ocular pharmaceutical adherence. Findings from this study indicate elderly patients treating an ocular condition with ocular pharmaceuticals expressed strong agreement with improving upon both educational and physical barriers as beneficial. Participants described their desire to address both barriers with eye care providers and with the ocular pharmaceutical products. Recommendations for further study included investigation of possible interventions addressing the impact of educational and physical barriers to elderly patient adherence to ocular pharmaceuticals. To conclude, health education professionals can provide education strategies to elderly patients by integrating information regarding educational and physical barriers to ocular pharmaceutical adherence by partnering with eye care providers, other healthcare professionals dispensing ocular pharmaceuticals, and the manufacturers of ocular pharmaceuticals.

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To my delightful husband, Cory Wagner, thank you for all the time and energy and devotion to your Type-A, persnickety, wife. You are my one true rock, and I your pebble. You are my reason.

"What if I fall?"

"Oh my darling, what if you fly?"

- Unknown

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Chapter I: Introduction

Visual impairment is a common consequence of aging, according to the National Eye Institute (n.d., para. 1) "as you age, you are at higher risk of developing age-related eye diseases and conditions." Age is considered a risk indicator for developing eye diseases and conditions for the aging population. Furthermore, with increasing age related vision diseases and conditions there is an increased use of pharmaceuticals as part of ocular therapy. Wilson et al. (2007, p.7) report, "forty percent of older adults take five or more prescription medications a day." While the management of multiple medication therapies is important, patient's adherence to their prescribed ocular therapy is also critical to the successful treatment of vision impairment or a vision related condition. Medication adherence rates for ocular pharmaceuticals are considered low. According to Wick (2012, para.1) these adherence rates drop "to between 50% and 80% within 6 months to a year." Because of this low medication adherence rate, it is important to consider how significant proper instillation of ocular pharmaceutics, such as eye drops, is to treatment. Medication adherence affects the success and effectiveness of a patient's therapy.

The problem of failing to correctly self-administer ocular pharmaceuticals is a substantial health care concern because non-adherence to ocular pharmaceutical therapy is likely to result in negative consequences to the healthcare system and an individual's health. Chisholm-Burns and Spivey (2011, p. 826) discuss how the "consequences of non adherence include worsening condition, increased comorbid diseases, increased health care costs, and death." These consequences of non-adherence can reduce the success of

the prescribed ocular therapy in an individual. Poor medication adherence to ocular pharmaceutical also burdens the healthcare system. Costs are compounded from wasted medication, extra resources are needed to treat health complications related to failed therapy, and the need to extend prolonged treatment of preventable failed therapy.

Statement of the Problem

Health educators must understand the educational and physical barriers preventing the optimum utilization of eye drops. They must also understand how these barriers affect adherence to prescribed ocular pharmaceutical therapy. A better understanding of the impact of these barriers can improve patient care and success of ocular therapy in elderly patients. Kass, Gordon, Morley, Meltzer, and Goldberg (1987) explains that improving the understanding of the individual needs of the patients and their difficulties with eye drops will lead to better adaptive patient care. Any deviation from proper instillation of ocular pharmaceuticals can result in a decreased successful treatment rate. Less than proper instillation of a medicated eye drop can negatively impact the success of a prescribed ocular pharmaceutical therapy. The patient's recovery from a condition or illness is potentially slowed down, risk for relapse of the condition or illness increases, or causes undue harm to the patient. As described by Marek and Antle (2008, p.1), "many of the risk factors related to inadequate medication management are items that are more prevalent in older adults living in the community." Therefore, this research study focuses on elderly persons aged 65 years and older who are particularly susceptible and at high risk to these educational and physical barriers.

Educational barriers are potentially instructional pitfalls for elderly persons for not understanding how to instill their prescribed eye drops correctly. Freda (2004)

discussed how increasingly, however, appropriately intended comprehensive patient education has become more difficult to accomplish. Instructional pitfalls include directions that are difficult to follow, confusing terminology or word choice in the directions, and a lack of visual or demonstrational guidance of how to correctly instill eye drops. These instructional pitfalls are educational barriers that may impede an elderly patient's understanding of how to correctly use eye drops and instill the medication as prescribed.

For this population of elderly patients, physical barriers to proper use of eye drops include mechanical disadvantages. Burns and Mulley (1992) explain that the majority of patients experienced some difficulty with the instillation of their drops. Some of these mechanical disadvantages are the inability to see and read instructions and limitations in capability to expel an eye drop from the container. It is important for health education professionals to understand why these educational and physical barriers are significant concerns to this study population. This knowledge permits health education professionals to assist in the improvement of patient adherence rates and optimize the beneficial health outcome elderly patients obtain from satisfactory adherence to ocular pharmaceuticals.

Significance of the Problem

From an ecological perspective, the problem of low patient adherence rate of pharmaceuticals is rather large and expansive. At the community and social group levels, the National Community Pharmacists Association (2013) estimates an added cost of $290 billion annually resulting from non-adherence to prescribed medication therapy. This is a significant amount of money that could be returned to the healthcare system to mitigate monies lost to fraud, waste, and abuse of medications. Repurposed monies associated

with non-adherence to prescription medication could be used to improve healthcare outcomes. At the individual level, non-adherence has significant and grave consequences. According to Ho, Bryson, and Rumsfeld (2009, p.3029) “non-adherence causes approximately 30 to 50% of treatment failures and 125,000 deaths annually.” Understanding educational and physical barriers that impact medication non-adherence can prevent these failures that cause harm, injury, and even death. It is evident from these studies that this problem has substantial impact at the community and individual levels.

A review of the available literature reveals that ocular pharmaceuticals are an under-assessed classification of medications for patient adherence rates. Therefore this research study, which focuses on educational and physical barriers for proper instillation of this class of medications, will add its observations and findings to the current health education literature. Additionally, the outcomes of this research study have potential for interdisciplinary use. Evaluating these two types of barriers can have translational benefits. The survey instrument developed for this research study can be used for subsequent study opportunities. The findings can be applied to other classes of medications or pharmaceutical therapies. There are patient and provider education materials, communication models, and potential intervention strategies that could be implemented and incorporated into multiple therapy management plans to lessen the impact of educational and physical barriers.

At multiple levels, from the community and social group to the individual, a better understanding of how educational and physical barriers impact patient adherence rates has the potential to improve health outcomes. These improvements could reduce

financial burden to health care system and progress patient's health by maximizing the health benefits from properly adhering to their prescribed ocular therapy.

Research Questions

1. For elderly patients, how can the educational barrier of a lack of understanding how to properly instill ocular pharmaceuticals be addressed and mitigated?
2. For elderly patients, how can physical barriers be addressed to improve the ability to properly self-administer eye drops as prescribed?

Limitations

Limitations of this research study include the following resource, participant, and methodology limitations:

1. Limited time frame for research development.
2. Limited time frame for data collection.
3. Limited financial resources may limit the sample size.
4. Obtaining sufficient sample size for the findings to have practical statistical significance.
5. Reliance on participant self-report and self-admission to their own educational or physical limitations.
6. Confidentiality agreements may also limit the sample size of the study.
7. Data collection will be gathered primarily through printed survey.

Delimitations

1. Sample population- Age restriction (elderly patients aged 65 years and older), number of willing elderly patient participants, and identifying patients who are

currently diagnosed with a condition requiring a prescribed ocular pharmaceutical therapy.

2. Time frame- Time is defined by the researcher's status as a graduate student conducting a study in two 15-week academic semesters.

Assumptions

The main assumption of this research study is that significant portions of ocular pharmaceutical (eye drop) users are elderly persons aged 65 years and older. This assumption is appropriate for this research study because there is a relationship between age and the number of prescribed medications for an individual. According to Hwang, Weller, Ireys, and Anderson (2001, p.267) for seniors "Out-of-pocket spending for prescription drugs was substantial." An extension of this assumption is that a higher proportion of older adults would also represent the larger portion of patients prescribed eye drops for ocular pharmaceutical therapy.

Definition of Terms

The following terms and definitions are included in this research to serve in the operational understanding of ocular pharmaceutical therapy. A pharmacy perspective of healthcare is applied towards the research questions in this study.

- Instillation: As defined by Hopper (2014, p. 144) as, "to place into; instructions are commonly used for ophthalmic or otic drugs, as examples."
- Medication Adherence: The Agency for Healthcare Research and Quality defines, (as cited in Centers for Disease Control and Prevention (CDC) 2013, presentation slide 5) "the patients conformance with the provider's recommendation with

respect to timing, dosage, and frequency of medication –taking during the prescribed length of time."

- Non-Adherence: Is defined by the American College of Preventative Medicine (2011, para.3) as, "the extent to which a patient's behavior (in terms of taking medication, following a diet, modifying habits, or attending clinics) coincides with medical or health advice."
- Ophthalmic Solutions: Are defined by the Aldrich and colleagues (2013, p.4) as, "sterile solutions intended for instillation in the eye."
- Persistence: The Agency for Healthcare Research and Quality defines (as stated by the CDC, 2013, presentation slide 5) as the, "duration of time patient takes medication, from initiation to discontinuation of therapy."

Chapter II: Literature Review

Introduction

An appraisal of current professional literature found that there is a moderate amount of research available about elderly patient adherence to prescribed medications. There are fewer studies on patients who are using eye drops as part of ocular pharmaceutical therapy. Studies that concentrate specifically on educational and physical barriers impacting elderly patient adherence to prescribed ocular medications are even more scant. This review of the literature related to this study's research questions focus on analyzing the information available on educational and physical barriers. This review of the related literature is primarily an integrative literature review and approaches the evaluation of educational and physical barriers with a pharmacy perspective to appraise significant historical studies and recent research. A literature review matrix of the literature reviewed for this thesis is available. (See appendix A).

This chapter concentrates on describing the educational and physical barriers and reviewing studies designed to address and evaluate their impact on elderly patients undergoing ocular pharmaceutical therapy. A discussion of recommendations from the studies is also included. This integrated literature review of studies related to these two barriers is critical because they strongly affect elderly patient adherence rates for ocular pharmaceutical therapy. According to the National Eye Institute (n.d., para. 1) "as you age, you are at higher risk of developing age-related eye diseases and conditions." This review centers on this elderly population because they are more likely than younger aged persons to be treated with ocular pharmaceuticals for an ocular condition or disease.

A critical review and evaluation of the available literature is a form of best practice, explained by Cottrell and McKenzie (2011, p.73) as "the concept of using evidence that result from the critical review of multiple research and evaluation studies that substantiate efficacy of an intervention in a certain population." Evaluating the history of research and works on these barriers connects previous works to the research questions posed in this study. This review identifies how health education research addressed educational and physical barriers that impact self-instillation of ocular pharmaceuticals and affect elderly patient adherence rates.

Timeframe of literature reviewed

The timeframe of the literature reviewed is defined by the advent of ocular pharmaceuticals to current date. Komatsu (2006) outlined the introduction of Federal Drug Administration (FDA) approved ocular pharmaceutical drug classes as follows; Pilocarpine preparations have been used since the 1870s. In the 1980s, beta-blockers were developed. Then in 1999, prostaglandin-type ophthalmic preparations were introduced to the drug market. This literature describes studies that focus on how educational and physical barriers impact a specific administrative class of ocular pharmaceuticals, that is, eye drops.

Structure and Organization

This literature review uses a parallel structure to describe both educational and physical barriers and directs the audience through historical works to recent studies. Pivotal studies are highlighted as they related to each barrier, elderly patient adherence rates, and the success rates of self-instillation. A historical background demonstrates

existing knowledge is available to address the research questions. It is important to show the trajectory of where research began to where the health education field is today. This also review emphasizes successes and failures in practice.

Health Education Theories and Models

This review of the existing literature and research studies found two prominent theories related to educational and physical barriers impacting elderly patient adherence of prescribed ocular pharmaceuticals- the Health Belief Model and Social Cognitive Theory. Both older and newer health education research gave credit to this model and theory. Rosenstock, Strecher, and Becker (1988) recognized that the Health Belief Model, Social Cognitive Theory, self-efficacy, and locus of control have all been applied with varying success to problems of explaining, predicting, and influencing behavior. From this review of professional literatures the Health Belief Model and Social Cognitive Theory has provided decades of strong support. I found this conclusion true, particularly for patient adherence to medications.

Health Belief Model. The Health Belief Model is a tried and true model. It is applicable to research about the educational and physical barriers impacting elderly patient ocular pharmaceutical adherence rates. A concept from the Health Belief Model, perceived barriers, lends itself to addressing research questions focused on barriers to health outcomes. According to Janz and Becker (1984, p.556) perceived barriers "proved to be the most powerful of the Health Belief Model dimensions across the various study designs and behaviors." This early work on perceived barriers is a significant component of the Health Belief Model. The concept illuminated how important educational and physical barriers are when factored into success of elderly patient adherence to eye drops.

The Health Belief Model is a suitable choice to provide foundational support for this research study.

Review of the literature also focused on the prominence of the Health Belief Model. It continues to be recognized as an applicable model for researching the contributing factors of elderly patient adherence to medications. Glanz, Rimer, and Viswanath (2008, p.42) stated, "it is among the most widely applied theoretical foundations for the study of health behavior change. The HBM is appealing and useful to a wide range of professionals concerned with behavior change." Seminal research studies have used the Health Belief Model to design and evaluate interventions intended to alter health behavior. This literature review found the model was applied to barriers impacting elderly patient adherence of medication for a variety of health conditions, including but not limited to chronic health conditions to specific illnesses such as diabetes and glaucoma. Healthcare providers from various disciplines, covering a wide range of health conditions and illnesses, offer prodigious support for the use of the Health Belief Model. This model is appropriate as a theoretical basis for this research study on the educational and physical barriers to elderly patient adherence to prescribed ocular therapy.

Social Cognitive Theory. The Social Cognitive Theory is a pivotal health education theory reflected throughout the literature reviewed for this research study. This theory has been used in multiple research studies and in interventions and programs designed to mitigate the educational and physical barriers to elderly patient adherence to medications. It was evident this theory serves as an appropriate foundation to support this research study. Introduced in the 1980's this theory has evolved in practice and grown in favor amongst numerous health education research studies. Bandura (1988, p.276)

presented the Social Cognitive Theory as, “a causal model where behavior, cognitive, and other personal factors, and environmental events all operate as interacting determinates that influence each other bi-directionally.” The Social Cognitive Theory and its focus on determinant factors was an evident choice for researchers investigating influencing factors on patient health behaviors. Examining these factors helped researchers understand why non-adherence behaviors are observed.

This literature review discovered subsequent studies continued to rely on the Social Cognitive Theory. Over a decade later, Bandura (2001, p.4) expanded upon the Social Cognitive Theory by stating “these belief systems are a working model of the world that enables people to achieve desired outcomes and avoid untoward ones.” Research about the educational and physical barriers are individualized exercises that impact patient adherence rates. Findings from this literature review helped to understand how these barriers play an important role in these cognitive self-regulatory processes. In the seminal study titled, “Patients' Beliefs about Prescribed Medicines and their Role in Adherence to Treatment in Chronic Physical Illness,” Horne and Weinman (1999, p.560) reported, “a relationship exists regarding patient beliefs about medicines to reported adherence rates.” Higher necessity scores were linked with higher reported adherence rates and higher concerns were linked to lower reported adherence rates. Longevity and reliability is key to substantiating the use of this theory in health education research studies related to the educational and physical barriers impacting elderly patient adherence.

Self-administering Medication in Elderly Patient Populations

Historical vantage points: patient-centered, provider- centered, and concordance. Self-administering medication is a complex patient behavior. This literature review found that studies are replete with attempts to observe, measure, or explain this behavior. Until the philosophy of concordance arose in the early 2000's there was compliance and adherence to medications. Horne et al. (2005) describe two primary vantage points found in the literature regarding the centricity of medication taking. These vantage points are from the perspectives of the patient or the provider.

The term compliance has been used to describe the action of taking medication as prescribed by the health care provider. However, the literature revealed that it is a controversial term. Compliance suggests the patient is a passive responder to the provider's directions. Vlasnik, Aliotta, and DeLor (2005, p.48) explain this perspective as, "adherence, formerly referred to as compliance, is a patient-centered term. It suggests that patients carry out and maintain certain behaviors, such as taking medications, after making an informed choice in a supportive environment." Studies that focus primarily on patient centricity, medication taking is in essence administering prescribed ocular pharmaceuticals as instructed by the healthcare provider.

In contrast to patient centered research, is medication adherence from the provider's vantage. Adherence is considered a more suitable term because it recognizes the patient as autonomous in their self-administration of medication. It also requires the patient to agree to the directions given to them from the health care provider, by recognizing the provider as having a larger role in the success or failure of a prescribed ocular pharmaceutical therapy. The American College of Preventative Medicine (2011)

suggests provider discussions help patients understand their illness and weigh the risks and benefits of undergoing pharmaceutical treatment. Handbooks reviewed in this literature review include, *Medication Management of the Community-Dwelling Older Adult. Patient Safety and Quality: An Evidence-Based Handbook for Nurses* and *Eye Drop Adherence: Waste, Contamination, Inaccuracy's Pharmacist's Guide*; which demonstrated this perspective by delineating the roles and responsibilities of the eye care provider when discussing pharmaceutical therapy plans.

Evolving from the compliance and adherence vantages of medication taking is the philosophy of concordance. A formative work that addresses the provider and patient relationship comes from Hughes (2004, p. 794), "Concordance represents a way in which [the patient] can assume responsibility and contribute to decisions on healthcare, particularly in relation to medications." This can be thought of as a therapeutic agreement between the patient and health care provider. Dowell, Jones, and Snadden (2002, p.31) suggest that this "type of patient centered prescribing, focused on patients whose care is sub-optimal, is likely to improve clinical outcomes as well as diffuse the issue of adherence." This literature review observed in the more recent studies that concordance is the predominant vantage for focusing on the factors and / or barriers that impact patients self-administering medication.

Despite the progression of medication adherence from a single perspective to a collaborative one, medication adherence rates have remained stagnant. As reported by the American College of Preventative Medicine (2011), rates of adherence have not changed much in the last three decades, despite pushes from the World Health Organization

(WHO) and Institute of Medicine (IOM) improvement goals.

Dimensions of medication adherence. A majority of the studies reviewed in this literature review agreed upon the use of the World Health Organization's five interacting dimensions of medication adherence. Introduced in 2003, these dimensions include 1) social/economic factors, 2) healthcare system, 3) medical condition-related factors, 4) therapy-related factors, and 5) patient behaviors. The American Society on Aging and American Society of Consultant Pharmacists Foundation (2006) addressed how these five dimensions affect medication adherence. (See Figure 2.1.). In summary of these dimensions, social and economic factors influence people to consider conflicting priorities. Healthcare system factors affect knowledge, training and performance of the health care team that includes the provider and patient as part of the system. Condition related factors represent illness-related demands experienced by the patient. Therapy related factors are unique characteristics of diseases and/or therapies. Patient behavior factors consider physical factors, such as visual impairment and impaired dexterity, as well as the resources, knowledge, attitudes, beliefs, perceptions and expectations of the patient. The factors applicable to each dimension and can be translated to perceived educational and physical barriers to using ocular pharmaceuticals.

Figure 2.1. Five Dimensions of Medication Adherence

Figure 2.1. The five dimensions of medication adherence listing factors within each dimension reported to affect adherence. From "Overview. Medication Adherence- Where Are We Today?" by American Society on Aging and American Society of Consultant Pharmacists Foundation, 2006, Adult Medication. Improving Medication Adherence in Older Adults, p. 13. Copyright 2006 American Society on Aging and American Society of Consultant Pharmacists Foundation.

It is important to note that not every factor indicated was applicable to this research study. A patient may have several risk factors for medication non-adherence and that each dimension may impact the patient more or less severely than another dimension.

Self-administration. Many factors are considered for patients who are self-administering their own eye drops to be considered adherent to their therapy. Non-adherence to medication can be considered either willful or inadvertent. There is a long list of behaviors that account for non- adherence to medications. Exhibiting just one of the following behaviors from this list considers the patient as non-adherent. The American Society on Aging and American Society of Consultant Pharmacists Foundation (2006) assembled a common list of behaviors associated with elderly patients. These behaviors are applicable to drug classes, including eye drops:

- Failing to initially fill a prescription
- Failing to refill a prescription as directed
- Omitting a dose or doses
- Taking more or less of a medication than prescribed
- Prematurely discontinuing medication
- Taking a dose at the wrong time
- Taking a medication prescribed for someone else
- Taking a dose with prohibited other medications
- Taking outdated medications
- Taking damaged medications
- Storing medications improperly
- Using medication administration devices improperly

Predictors of non-adherence. Elderly patients' non-adherence to medication regimens has the potential for negative health outcomes and far-reaching medical and

economic consequences. As Balkrishnan (1998, p.764) discussed, “as average life expectancy increases, so do the incidence of chronic diseases and the number of persons receiving long-term drug therapy.” Therefore preventing non-adherent behaviors is important in the design of medication-management programs for this population.

Davis et al. (2006, p.849) recommends, “identification of older persons at risk for medication non-adherence is just the first step in addressing this problem.” There are warning signs of non-adherent behaviors of which healthcare providers and educators must understand and be aware. Ho, Bryson, and Rumsfeld (2009) describe this awareness and observation, although insensitive, of patient self-report of non-adherence is specific enough and can predict future adverse outcomes. These signs of non-adherent behaviors may not be obvious and health educators must be attentive to these signs.

Touchette and Shapiro (2008) identified common risk factors for poor medication adherence, these are similar to risk factors reported by studies reviewed in this chapter and listed as follows:

Educational predictors:

- Low or limited language proficiency
- Lack of belief in benefit of treatment
- Inadequate follow-up or discharge therapy planning
- Complexity of medication regimen
- Side effects or fear of adverse reaction
- Lack of insight into illness

Physical predictors:

- Lower cognitive function

- Impaired physical limitation
- Reduced dexterity
- Substance abuse

Recommendations for study gaps

It is evident that medication adherence is a complex behavior that is strongly influenced by multiple dimensions. The World Health Organization, (2003) suggests medication adherence is related to patient knowledge and beliefs about their illness, motivation to manage it, confidence in their ability to engage in illness-management behaviors, and expectations regarding the outcome of treatment and the consequences of poor adherence. Therefore, researchers would expect these influencing factors impacting patient's medication-taking behavior to change over time.

Two recommendations became apparent during this literature review; the need to conduct multiple medication adherence assessments and to standardize the measurements used in the assessment tools. Lee, et al. (2007) saw temporal changes in adherence measures when assessed using general linear models for repeated measures. This study highlights routine adherence assessments throughout a course of therapy. Recommendations for future research to standardize medication adherence measurements was suggested by multiple studies and emphasized by Morisky, Ang, Krousel-Wood, and Ward (2008, p.348) who endorse this as a need for an "out-patient clinical settings need for a valid, reliable, cost-effective tool that is accepted by both health care providers and patients for measuring medication adherence." For a better understanding of the significance of medication non-adherence, future research should focus on these

recommendations to standardize medication adherence measurements and use a standardized assessment tool among the elderly.

Educational Barriers

Studies were reviewed for identification of educational barriers related to elderly patients using eye drops as part of their ocular pharmaceutical treatment. This review included a search of research and literature that focused on components including health literacy, lack of language proficiency, and unproductive provider/patient communication methods. Educational barriers to understanding how to correctly use medications as prescribed by health care providers are a continuing problem facing patients, providers, and health educators. Health literacy is a known issue, as Nkukuma Ngoh (2009, p.132) states, "limited health literacy has been associated with poorer health, medication non-adherence, medication errors, higher medical expenses, and increased hospitalization." Similar observations were reported and reinforced these factors as a component of educational barriers. Educational barriers negatively impact use of ocular pharmaceuticals. Low literacy rates and a lack of language proficiency were identified as predictors of medication non-adherence.

A review of the available literature reveals a minimal number of studies have been conducted specifically on the impact of poor health literacy, lack of language proficiency, and provider/patient communication methods for ocular pharmaceutical therapy. Clifford, Barber, Elliott, Hartley, and Horne (2006) discuss the benefits from improved communication when pharmacists are meeting patients' needs for information and advice on medicines. Seven studies identified in this review addressed educational

barriers to glaucoma therapy. There is a lack of studies on educational barriers applicable to eye drops in ocular pharmaceutical therapy outside of glaucoma-specified conditions.

A majority of studies reviewed for educational barriers that impact elderly patient medication adherence relied on qualitative research methods to gather information on eye drop users. The most commonly used tools were surveys, questionnaires, and in-depth interviews. For a majority of tools used to measure adherence Garber, Nau, Erickson, Aikens, and Lawrence (2004, p.649) suggest, "Questionnaires and diaries tend to have moderate-to-high concordance with other measures of medication adherence." However, interview-based self-reports are not concordant with electronic measures. This inconsistency found in assessment measurement was a common occurrence amongst studies reviewed.

Similar analysis techniques were applied by studies assessing educational barriers. The reported measurements were variable and unequivocal, thus making it incredibly difficult to compare results from multiple studies. Hess, Raebel, Conner, and Malone (2006) discussed how many measures used to assess adherence may or may not be comparable or accurate. Not having a standardized measure or scale is a predicament when trying to argue the importance of educational barriers. This is a discrepancy that studies focused on performing systematic reviews stated needing to be addressed. However, no study was identified having actually attempted to establish standardized measurement for comparing the various studies.

The statistical results of research studies on educational barriers did not demonstrate a range of values. Effect size of education barriers reported by various

studies on the adherence rates was consistent. Peterson, Takiya, and Finley (2003) indicate interventions focused on education barriers had an overall effect size effect size of 0.11. The reported size effect of education barriers indicated no differences among the different types of educational interventions researched.

Emerging from this review of available literature and studies on educational barriers were recommendations for mitigation. Several studies suggested development of a medication adherence model to guide healthcare providers. According to National Council on Patient Information and Education (2007, p.1) “to achieve the awareness, behavior changes, and additional resources for research and education that will improve patient medication adherence requires an ongoing partnership.” The purpose of developing a medication adherence model is to reduce the impact of education barriers on patient adherence to ocular pharmaceuticals. There is advocacy for educational strategies focused on patient behaviors. Addressing educational barriers through opportunities to engage providers and patients is a two- pronged approach to improving medication adherence. This review of the professional literature observed the Medication Adherence Model and the SIMPLE method as two influential works prominent in discussions regarding educational barriers.

The Medication Adherence Model was developed to describe the process of medication adherence and instruct health care providers in a systematic method of assessing medication taking. Johnson (2002) suggests the model is structured with the idea that two types of non-adherence contribute to inconsistent medication taking. The first type of non-adherence is the intentional decision to miss medications. The second

type is unintentional interruptions that cause medications not to be taken. This model allows providers with an opening to evaluate these two types of non-adherence. Providers could also measure significance and overall effect of education barriers on ocular pharmaceutical adherence. Providers can parlay the results and use them in the treatment plan. These two types on non-adherence factors are employable as measurable indicators of ocular pharmaceutical adherence.

The SIMPLE method is an educational strategy to improve medication adherence. According to Atreja et al. (2005, p. 4) it stands for S-simplify regimen, I-impart knowledge, M-modify patient beliefs and human behavior, P-provide communication and trust, L-leave the bias, and E-evaluate adherence. There is an abundance of support behind the SIMPLE method because it focuses on patient education. However, the method recognizes that education strategies must be paired with a simple regimen and effective provider/patient communication to modify medication adherence behaviors. This prominent study recommended promising strategies for providers and for patients to alleviate educational barriers.

Physical Barriers

This literature review found few research studies that focused on addressing physical barriers and how patients perceive physical capability as a function of adherence to therapy. Winfield, Jessiman, Williams, and Esakowitz (1990) explain their results indicated a high prevalence of non-compliance was compounded by inabilities to adequately instill a drop into the eye. Studies dedicated exclusively to researching physical barriers to ocular pharmaceutical instillation were few. Physical factors are a

patient related dimension of patient adherence. Examples of physical components that are barriers to correctly instilling eye drops are vision loss, cognitive ability, and factors such as impaired mobility or dexterity.

Studies reviewed noted safety issues associated with vision loss. Low vision and blindness affect a person's ability to read prescription labels and information sheets about medications, distinguish colors and markings identifying a medication, and see measurement gauges on devices and tools. Elderly patients who cannot see and read prescription labels must rely on memory when self-administering eye drops. A physical risk for patients with low vision or vision loss is a physical condition. These are physical barriers for patients not taking their medications correctly or at all.

Cognitive factors include physical and neurological impairment components such as memory loss. Salzman (1995) noted that forgetting to take a medication is a common problem in older people. This is reported as the most common barrier hindering the elderly when taking medications. Not instilling ocular pharmaceuticals correctly and timely due to forgetfulness is a non-adherent behavior associated with physical barriers.

The last physical barrier related to elderly patients adherence to their ocular therapy is impaired motility and dexterity. These are specific physical barriers that may make it difficult for a patient to accurately instill or measure a dose. In the case of ocular pharmaceutics, a patient with impaired mobility or dexterity may be unable to position the eye dropper tip, apply enough pressure to the container to expel an eye drop, or instill the eye drop with enough precision into the eye’s conjunctiva sac.

The small portion of studies in this literature review that focused on physical barriers relied on qualitative research techniques to gather information on eye drop users. The studies assessing this barrier used similar instruments to collect data. Surveys, questionnaires, and observing instillation demonstrations were the main qualitative research instruments reported in the available studies.

Researchers from studies available applied similar analysis techniques to assess the impact of physical barriers on eye drop medication adherence. The reported measurements were variable and unequivocal, thus making it very difficult to compare results from one study to another. Similar to studies on education barriers, not having a standardized measure or scale is a quandary. Health educators need reliable measurements to emphasize the importance of minimizing physical barriers. The literature reveals studies focused on performing systematic reviews have acknowledged this discrepancy in reported measurements. To date, no study has tried to establish a standardized measurement guideline for evaluating physical barriers.

The statistical analysis of data on physical barriers demonstrated a stronger effect size on medication adherence. Morisky, Green, and Levine (1986) reviewed the psychometric properties to test the concurrent and predictive validity of a structured four-item self-reported adherence measure. Items in this scale address physical barriers to medication taking, however, the scale is not specific to ocular pharmaceuticals. A stronger measure warrants the health care provider to reinforce positive medication adherence behaviors. However, with so few studies to report findings of the effect of physical barriers on medication adherence, there is a problem due to this lack of support

for a consensus of statistical significance.

In the literature reviewed, three types of recommendations were found to help elderly patients overcome physical barriers and instill eye drops. This was emphasized by Tsai, Robin, and Smith (2007, p.29) as "an important factor that is often overlooked is the method of eye drop administration, including the handling, storing, and actual administering of eye drops." Strategies for minimizing physical barriers involve self-administering eye drops in optimal environmental conditions, the use of alternative label formats for elderly persons with visual impairment and the use devices to improve patients physical capability to instill the correctly into the conjunctiva sac with the correct number of drops and accurate dosage.

Optimal physical environment that promotes accurate medication use include five key areas—1) illumination, 2) minimizing interruptions and distractions, 3) reducing sound and noise, 4) considering physical design and organization, and 5) designating medication safety zones. These ideal environmental conditions are recommended by Grissinger (2012) to minimize distractions for an elderly patient. When possible instillation should be performed in ideal settings that accommodate these five key areas conducive to correct eye drop instillation.

The American Society on Aging and American Society of Consultant Pharmacists Foundation (2006) recommends the use of alternative label formats and devices for elderly persons with visual impairment to help overcome physical barriers. Recommendations from the American Society on Aging and American Society of Consultant Pharmacists Foundation (2006) also include:

- Asking the person if he or she needs help and what would be useful
- Using large print on labels and written materials (minimum 16 point)
- Using black ink on light background (high contrast) for written materials
- Avoiding materials that reflect light or cause glare
- Providing large print duplicate prescription label
- Giving clear verbal instructions
- Using color coding on medication containers (if patient can detect color) or different color labels on the bottles to indicate when to take medications
- Using electronic dispensing devices with an alarm when dose is due
- Using magnifying device
- Encouraging improved lighting where medications are stored and taken
- Using aids or tools to assist in instilling ocular pharmaceuticals (American Society on Aging and American Society of Consultant Pharmacists Foundation, 2006).

The use of mechanical aids can be helpful to elderly patients to overcome physical barriers to instilling eye drops. These devices are designed to assist the patient overcome various physical barriers. Corlett (1996) described the following trade-name eye drop devices: Opticare, Autosqueeze, and Autodrop. Eye drop devices aid in positioning the eye drop, so instillation is performed correctly. The eyedropper tip is aimed with precision into the conjunctiva sac. Additionally, these aids help to enhance the physical strength of a patient to squeeze the correct size eye drop from the bottle. Drop size is important because too large or small of a drop is a variability in dosage.

Gaps in the Literature

Three main gaps were found in the literature available on education and physical behaviors that impact elderly patient adherence to ocular pharmaceutics. The available studies in this literature review did not explain in great detail these potential barriers to medication adherence. They did not necessarily focused on patients undergoing ocular pharmaceutical treatment. Lastly, there was a clear limitation of the data available.

Although there is a moderate amount of information and research completed on medication adherence, these particular barriers to correct usage are not well described. Gellad, Grenard, andMarcum (2011, p.11) summarized this observation well, "medication non-adherence in the elderly is not well described in the literature, despite being a major cause of morbidity, and thus it is difficult to draw a systematic conclusion on potential barriers based on the current literature." Most of the recent studies recommend further research or investigation into the additional potential factors that contribute to education or physical barriers. However, to date, this literature review found the education and physical barriers impacting the dimensions of medication adherence under-evaluated.

In addition to detecting studies that under-evaluated barriers to medication adherence, only two studies actually recommended findings that were translational to ocular pharmaceuticals. Notably, most of the studies related to ocular pharmaceuticals were tied to glaucoma diagnosis and therapy. This literature review found seven studies focused on ocular pharmaceutical treatments for glaucoma. A total of five studies focused specifically of educational or physical barriers and the impact on patient medication adherence to ocular pharmaceutical therapy. This literature review search found three

studies focused explicitly on education barriers to patient adherence to ocular pharmaceutical therapy. Only two studies focused on exactly on the physical barriers impacting patient adherence to ocular pharmaceutical therapy. This scarce number of available studies demonstrated just how under-evaluated this class of pharmaceuticals is in health education literature.

The data available, through literature database searches, for this literature review was also limited. In order to assess the available literature for the research questions required independent searches of the key words: elderly patients, medication adherence, educational and physical barriers, and ocular pharmaceuticals. Refining the database search to find studies that focused explicitly on the research questions required connected searches (linked Boolean method) of these same key words. The databases searched included Ageline, BioMedCentral, Cochrane Plus Collection, MEDLINE, and ScienceDirect. This literature review revealed that very limited data has been collected that comprehensively addressed elderly patients, medication adherence, educational and physical barriers, and ocular pharmaceuticals. Inadequate available data collected on ocular pharmaceutical therapy was an issue. Mojtabai and Olfson (2003, p.228) highlight the problem with limited data and argued that, “despite widespread public attention to this issue, little information exists concerning the use of medications and health outcomes among Medicare beneficiaries without prescription drug coverage.” Data on elderly patients relies heavily on prescription claims data. In the United States potential sources of raw medication data comes from Medicare information. A majority of the studies reviewed collected data from surveys, interviews, and interventions, but also made use of claims data, referenced in their methodology.

Summary

Low medication adherence rates to ocular pharmaceuticals continue to be a problem in health education. The historical perspectives of medication taking were either from a patient-centered vantage or a provider vantage point. Perspectives then transitioned the focus of medicine taking from compliance, to adherence, and most recently concordance. More recent studies focus on concordance, where a patient and provider agreement on ocular pharmaceutical therapy. This integrative literature review considered the available works and selected featured studies and key research conducted on elderly patient adherence to instilling ocular pharmaceutical medication.

The emphasis of this review was on the impact of educational and physical barriers to correct eye drop instillation in elderly populations. Educational and physical barriers played a large part in patient adherence to their prescribed ocular pharmaceutical therapy. This review of related literature describes how previous and current studies have investigated the problem of educational and physical barriers and evaluates programs for their success or failure in improving patient adherence rates. Educational recommendations aligned with these by Okeke, et al. (2009) are understanding educational efforts to improve patient drop taking played an important role in improving patient adherence. These included instruction on proper administration of eye drops, correct dosing schedules, minimization of waste of medication, and a clear discussion that vision can be lost if the medications are not used properly. Strategies to minimize education barriers integrates an agreed upon provider/patient ocular pharmaceutical therapy. The strategies include a two pronged approached to address health literacy and lack of language proficiency. Suggestions from studies reviewed to lessen the negative

impact of physical barriers such as Lacey, Cate, and Broadway (2009) emphasized common recommendations to improve the operational and technique issues as the main areas of physical barrier concerns to mediation adherence. These recommendations included optimizing environmental conditions, advocating for alternative label formats, and suggesting the use of eye drop instillation tools or aids to express eye drop solution into the eye. For both education and physical barriers standardized measurement is encouraged to increase validity and reliability of patient adherence assessments.

Chapter III: Methodology

Introduction

The purpose of this research was to assess and evaluate elderly patients' attitudes and behavior about educational and physical barriers and the impact on adherence to ocular pharmaceuticals. This chapter describes the research design of this study and selection of eligible participants, survey instrument, data collection, data analysis, and pilot test used to gather data. The Minnesota State University, Mankato Institutional Review Board (IRB) was approved the study proposal on February 24, 2015. (See Appendix B).

Research Questions

1. For elderly patients, how can the educational barrier of a lack of understanding of how to properly instill ocular pharmaceuticals be addressed and improved upon?
2. For elderly patients, how can physical barriers be addressed to improve the ability to properly self-administer eye drops as prescribed?

Research Design

This thesis research is designed as a one-time cross sectional study. The methodologies employed are quantitative research techniques. Data were collected using a survey instrument that included an open response portion to three questions. The following sections describe the methods selected for inclusion criteria, instrumentation, and procedure. Descriptions of the qualitative and statistical analysis for this research study are also included.

Inclusion criteria. Inclusion criteria for participants in this study were very particular. To address how educational and physical barriers impact patient adherence to eye drops requires specific criteria based upon age, diagnosis, and treatment. The inclusion criteria for this research study are:

1. The participant must be aged 65 years or older.
2. The participant must be diagnosed with an eye disease, condition, or illness.
3. The participant is currently under going ocular pharmaceutical treatment with eye drops at the time of data collection.

This research study used homogenous sampling procedures to find participants for this study population. According to Cottrell and McKenzie (2011, p.132) homogenous sampling procedures "includes individuals chosen because of a unique trait or factor they posses." The unique trait in this study is a participant is selected because she/he possesses a unique diagnosis requiring treatment with eye drops. Homogenous sampling procedure is appropriate for this study because of the difficulty in identifying participants with a specific health condition and treatment approach and identifying an acceptable number of eligible participants.

Instrument consideration. When studying subjects who are currently undergoing ocular pharmaceutical therapy, the survey instrument must consider addressing areas of concerns that include private health information and confidentiality. The in-person and online consent forms explained the purpose of this study and a form was included with every survey instrument. (See Appendix C and Appendix D). To safeguard the patient's private heath information and confidentiality, participants are not asked to include their name on the survey instrument. Additionally, the survey does not

focus on demographic questions that could identify a participant. The two demographic questions included in the survey instrument are participant age and gender.

Instrument design. Instrument design required incorporating the participant inclusion criteria questions into the survey. This allows the researchers to easily identify which participants were eligible. Using inclusion criteria as survey questions ensures the data collected is relevant to answering the questions asked in this study.

The survey instrument format began with a statutory question set that included general demographic questions and inclusion criteria questions. These statutory questions were designed to identify eligible participants. The survey questions focused on addressing the educational and physical barriers of instilling eye drops will collect data to support the operational constructs. These Likert-scale questions identify levels of agreement about educational and physical barriers. The survey instrument format ended with open-response questions. This question type provided participants with an opportunity to share qualitative details regarding their ocular pharmaceutical experience.

The survey instrument design utilized statutory, Likert-scale, and open response questions to gather a wide breadth of data. Data collected from this instrument are directly pertinent to the research questions and help in understanding the impact of educational and physical barriers on patient adherence to their prescribed eye drop therapy.

Validity and Reliability

Validity. The researcher developed the survey instrument for use in this thesis study. To ensure content validity of the survey instrument, the survey questions were written with the advisement of two pharmacist advisors. (See Appendix E). Conferring

with professionals from the pharmaceutical field of work supports the validity of the survey questions. The survey questions were designed to gather information and data related to the research questions. This additionally ensured the questions were written with a pharmacy perspective and maintained the continuity of this thesis study within scope of ocular pharmaceutical therapy.

Reliability. Reliability measures were integrated into the survey instrument. There is only one version of the survey instrument. Using only one version of the survey ensured each participant was exposed to the same questions. This addressed measurement consistency because using one version of the survey instrument elicited the same type of responses from the same questions.

Pilot Test

A group of four people who met inclusion criteria were asked by the student researcher to test the survey instrument. It was administered as described for in-person survey takers. The feedback collected was used to improve its design. Regarding the procedure the pilot test group made the recommendation that the researcher should be available for questions. An observation noted about survey administration was the time to complete the survey questions was actually less than the five minutes stated on the consent form. Feedback collected about the survey instrument was also gathered. The pilot test group recommended larger font. This recommendation was used and the survey font-size was increased. The pilot test group also suggested that the Likert-type education/instruction questions could be more concise. The changes collected from the pilot test group were incorporated in the final survey instrument used for this study.

Data Collection Process

Research design description. This study used a conjugated research design to gather data and answer the two research questions. The design used both a quantitative and qualitative data collection techniques. The survey questions gathered responses from participants about their perception of educational and physical barriers. Participants could also provide responses regarding the impact of these barriers on their adherence to their prescribed ocular therapy. The narratives provided to the open response questions gave in-depth and detailed information about experiences and offered perspectives on undergoing prescribed ocular pharmaceutical therapy.

Survey administration procedure. Prior to distributing the survey instrument, the researcher obtained approval from Minnesota State University, Mankato IRB to conduct research on human subjects.

The survey instrument was distributed in-person and electronically. In-person events were conducted at local Minneapolis area senior centers. Written permission was granted by the Edina Senior Center (See Appendix F) and by the Burnsville Senior Center (See Appendix G). A table set up was arranged to offer the surveys to persons who visited the community center on March 3, 2015 and March 10, 2015. With each encounter, the researcher explained the purpose of the study before asking a person to take a survey. Before a survey was taken the consent form was offered. It was read aloud, when requested. Then a signature was collected prior to the survey questions being answered. When the participant completed the survey, it was collected and placed in an envelope. The researcher offered the participant a copy of the consent form. Lastly and equivocally important was that participants were thanked for their time.

Electronic distribution of the survey was conducted using the online survey administrative tool, Zoomerang ™. The researcher set up a user account with administrative rights that established distribution controls. These controls included defining the inclusion criteria to target eligible survey participants. Zoomerang ™ allowed the researcher to define who the potential respondents were by restricting the respondent pool. The criteria entered into the Zoomerang ™ database to target an audience for this survey were age and treatment. After the researcher defined the target audience, an electronic version of the consent form and survey was distributed to the target audience email lists. The respondents were required to indicate they had received the consent. Requiring the consent form to be acknowledged prior to beginning the actual survey is an administrative control. Another administrative control in place was the timeframe for administering and collecting surveys; approximately two-weeks between February 25, 2015 to March 11, 2015. As surveys were completed, Zoomerang ™ securely cached the surveys for the researcher.

Analysis of Data

The data analysis procedure used for this research study was descriptive statistics. Analysis of the quantitative data collected from the survey was completed using the SPSS analytical tool. The table of specifications lists how each survey question tied directly to the research questions asked in this thesis study. (See table 3.1). The research questions were designed to collect interval, nominal, and ordinal data. The data were analyzed with descriptive statistical analysis to evaluate the frequency and percentage of responses.

Table 3.1

Table of Specifications

Research Question (RQ)	Survey items or methods used to assess RQ'S	Level of Data (Nominal, Ordinal, Interval/Ratio)*	Analysis needed to assess RQ
1. How can the educational barrier of a lack of understanding how to properly instill ocular pharmaceuticals be addressed and mitigated?	What is your eye condition?	Nominal	Frequency, Percentage
	How long have you been using eye drops to treat your eye condition?	Interval	Frequency, Percentage
	How frequently do you see your Optometrist or Ophthalmologist? - Never - 1time each year - 2 to 3 times each year - More than 4 times each year	Ordinal	Frequency, Percentage
	Who provides you with instructions on how to use your eye drops? - Optometrist or Ophthalmologist - General or Primary Physician - Physicians' assistant - Nurse - Pharmacist - Other: Please, describe _____ - No one	Nominal	Frequency, Percentage
	How many eye drops are lost and do not make it into your eye(s) per dose? - No drops are lost per dose - 1 to 2 drops are lost per dose - 3 to 4 drops are lost per dose - More than 5 drops are lost per dose	Ordinal	Frequency, Percentage

Table 3.1

Table of Specifications

	How many eye drops do you use to treat your eye condition? - One - Two - Three or more	Ordinal	Frequency, Percentage
	How long have you been using your eye drops to treat your eye condition? - Less than 1 week - 1 to 2 weeks - 3 or more weeks		Frequency, Percentage
	Instructions on how to use your eye drops are easy to follow. 1- Strongly Agree 2- Somewhat Agree 3- Indifferent 4- Somewhat Disagree 5- Strongly Disagree	Ordinal	Frequency, Percentage
	Word choice to explain instructions is clear to understand how to use your eye drops. 1- Strongly Agree 2- Somewhat Agree 3- Indifferent 4- Somewhat Disagree 5- Strongly Disagree	Ordinal	Frequency, Percentage
	Using pictures to illustrate instructions for how to use your eye drops would improve your understanding of how to use them. 1- Strongly Agree 2- Somewhat Agree 3- Indifferent 4- Somewhat Disagree 5- Strongly Disagree	Ordinal	Frequency, Percentage

Table 3.1

Table of Specifications

		Using video instructions to demonstrate the instructions for how to use your eye drops would improve your understanding of how to use them. 1- Strongly Agree 2- Somewhat Agree 3- Indifferent 4- Somewhat Disagree 5- Strongly Disagree	Ordinal	Frequency, Percentage
		What do you believe are educational barriers to effective use? In your opinion, how could the instructions for your eye drops be improved?	Ordinal- looking for themes	Frequency, Percentage
2.	How can the physical barriers be addressed to improve the ability to properly instill prescribed eye drops?	How many eye drops are lost and do not make it into your eye(s) per dose? - No drops are lost per dose - 1 to 2 drops are lost per dose - 3 to 4 drops are lost per dose - More than 5 drops are lost per dose	Ordinal	Frequency, Percentage
		Instructions in larger font would improve your ability to see and read the instructions clearly. 1- Strongly Agree 2- Somewhat Agree 3- Indifferent 4- Somewhat Disagree 5- Strongly Disagree	Ordinal	Frequency, Percentage
		Having your health care professional demonstrate how to properly use your eye drops would improve your ability to use them on your own. 1- Strongly Agree 2- Somewhat Agree 3- Indifferent 4- Somewhat Disagree 5- Strongly Disagree	Ordinal	Frequency, Percentage

Table 3.1

Table of Specifications

	An eye drop dispenser tool would improve your ability to properly use your eye drops. 1- Strongly Agree 2- Somewhat Agree 3- Indifferent 4- Somewhat Disagree 5- Strongly Disagree	Ordinal	Frequency, Percentage
	Do you have a physical limitation that makes using eye drops difficult? Does this limitation require additional tools or devices to assist in using eye drops?	Ordinal- looking for themes	Frequency, Percentage
	Does the location of where you instill eye drops (your environment) impact your ability to use them?	Ordinal- looking for themes	Frequency, Percentage
* Indicates level of data for survey items or methods, not RQ's			

To evaluate narrative responses from the open-response questions on the survey instrument this study used the ethnographic statistical procedure. According to Vinson (2012, p.1) the ethnographic method is "a data-driven method for analyzing real world observations provided by others." The ethnographic statistical procedure was appropriate for this study because this procedure is more reliable for qualitative evaluation techniques. This procedure analyzes valid measures for population-defined constructs by identifying common themes shared among the responses to these open-response questions. For this study, ethnographic procedure was used to make systematic observations from the narratives provided from the participants. Trends or themes observed in data collected are discussed in the following chapters.

Chapter IV: Findings

Introduction

The purpose of this research was to assess and evaluate elderly patients' attitudes and behavior about educational and physical barriers and the impact on adherence to ocular pharmaceuticals. In order to collect data a 19 question survey was developed and administered in person at the Edina Senior Center and Burnsville Senior Center and online via Zoomerang ™ regarding attitudes on educational and physical barriers and their impact on ocular pharmaceutical adherence. The findings from the quantitative and qualitative analysis for each research question are presented in this chapter.

Survey Responses

After IRB approval was obtained, data collection occurred over a time frame of two weeks from February 25, 2015 to March 11, 2015. A total of 140 survey responses were collected for this research study. Sixteen of these surveys were collected from in-person tabling events; six from the Edina Senior Center during a Bridge game night and 10 from Burnsville Senior Center during a scheduled social painting event. The online survey was open and responses were collected for 14 days from February 25, 2015 to March 11, 2015. One hundred and twenty-four responses were collected electronically.

Eligible Survey Responses

Thirty-four survey responses collected were considered eligible for the scope of this research study. The respondents included in this analysis met the inclusion criteria of being 65 years of age or older, undergoing the treatment of an eye condition, and the use

of eye drops as part of their ocular pharmaceutical therapy. A flow chart for determining participant eligibility for this research study is presented in this chapter. (See Figure 4.1). Because of the design of this research study both quantitative and qualitative statistical analyses were used to answer the research questions. By completing the survey instrument and/or by signing the consent form, participants gave consent. Responses from the 34 eligible participants who met the inclusion criteria of being 65 years of age or older, treating an ocular condition, and using eye drops as part of their ocular therapy were coded and entered into a SPSS database for analysis.

Ineligible Survey Responses

One hundred and six survey responses were considered ineligible for the scope of this research study. Specifically, nine survey responses were excluded from analysis based upon age criteria because five respondents were less than 65 years of age, three respondents did not provide their age in years, and one respondent did not provide their age in an interpretable format. Additionally, seventy survey responses were excluded from analysis because the respondents indicated they were not being treated for an eye condition. Specifically, these respondents indicated ‘no’, ‘none, or ‘NA’ to this question and eight respondents did not provide a response or left this question blank. Of the respondents with an eye condition, twenty-seven respondents indicating their treatment did not include the use of eye drops as part of their therapy.

Figure 4.1. Flow of Participants in Research Study

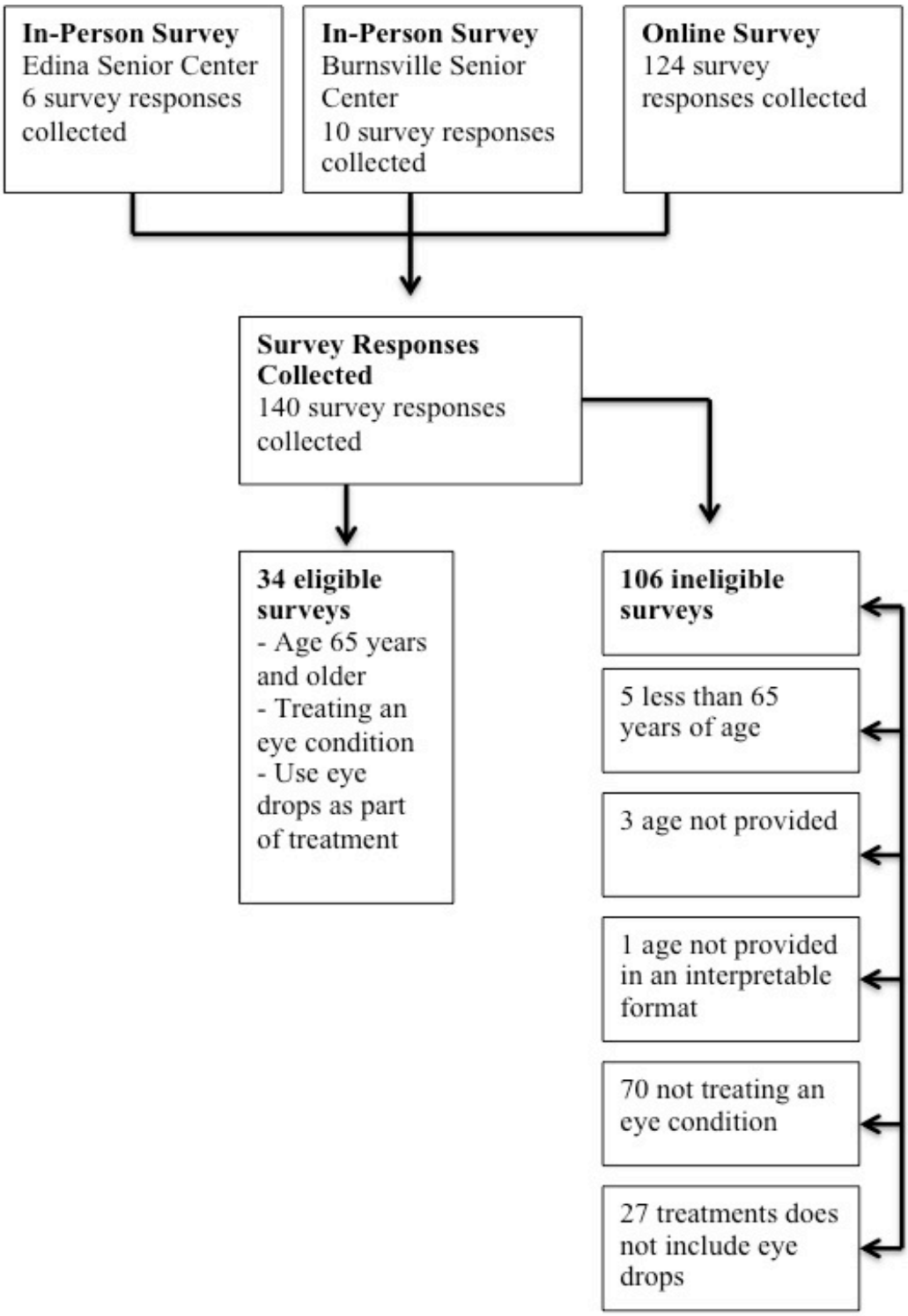

Figure 4.1. Flow chart describing eligible participants in the study

Respondents Demographics

The demographic information obtained from this research study included the age and gender of the respondents. The median age of the eligible respondents is 69 years of age. The range of ages of the respondents is 65 years to 99 years. Demographic data revealed that 38.2% (n= 13) were male, 58.8% (n=20) were female, and 2.9% (n=1) did not indicate a gender.

In order to identify selected elderly patients using ocular pharmaceuticals as part of their therapy, participants were asked to describe their ocular conditions. All 34 participants responded to this question. This included identification with a singular ocular condition or multiple ocular conditions being treated with ocular pharmaceuticals. 36.6% (*n* = 15) identified as having *dry eye,* 19.5% (*n* = 8) identified as having *Glaucoma*, 12.2% (*n* = 5) identified as having *cataracts*, 4.9% (*n* = 2) identified as having *Macular Degeneration*, 4.9% (*n* = 2) identified as having Allergies, 4.9% (*n* = 2) identified as having *near-sightedness (myopia),* 2.4% (= 1) identified as having *sensitivity to light*, 2.4% (*n*= 1) identified as having *stroke*, 2.4% (*n* = 1) identified as having *Strabismus*, 2.4% (*n* = 1) identified as having *Shingles*, 2.4% (*n* = 1) identified as having *Sjogren's Syndrome*, and 2.4% (*n* = 1) identified as having to *wear glasses*. (See table 4.1.)

Table 4.1

Ocular Conditions Reported by Elderly Patients Currently Being Treated with Ocular Pharmaceuticals

Ocular Condition	Male	Female	Gender Not Specified	Frequency	%
Dry eyes	1	13	1	15	36.6
Glaucoma	5	3	0	8	19.5
Cataracts	4	1	0	5	12.2
Macular Degeneration	0	2	0	2	4.9
Allergies	1	1	0	2	4.9
Good	2	0	0	2	4.9
Near-sightedness (Myopia)	0	2	0	2	4.9
Sensitivity to light	0	1	0	1	2.4
Stroke	1	0	0	1	2.4
Strabismus	1	0	0	1	2.4
Shingles	1	0	0	1	2.4
Sjogren's Syndrome	0	1	0	1	2.4
Total Responses	16	24	1	41	100

Research Question 1: For elderly patients, how can the educational barrier of a lack of understanding how to properly instill ocular pharmaceuticals be addressed and mitigated?

In order to understand how the educational barrier of a lack of understanding how to properly instill ocular pharmaceuticals can be addressed and mitigated; participants were asked to designate the frequency of visits to an optometrist or ophthalmologist. All 34 participants provided a response; 2.9% (n = 1) participants reported they *never* made a visit to their optometrist or ophthalmologist, 44.1% (n = 15) reported they visit their optometrist or ophthalmologist 1 time each year, 38.2% (n = 13) reported they visit their optometrist or ophthalmologist 2 to 3 times each year, and 14.7% (n = 5) reported they visit their optometrist or ophthalmologist more than 4 times each year. (See table 4.2).

Table 4.2

Frequency of Visits to an Optometrist or Ophthalmologist as Reported by Elderly Patients Currently Being Treated with Ocular Pharmaceuticals

Responses	Male	Female	Gender Not Specified	Frequency	%
Never	1	0	0	1	2.9
1 time each year	4	11	0	15	44.1
2 to 3 times each year	6	7	0	13	38.2
More than 4 times each year	2	2	1	5	14.7
Total Responses	13	20	1	34	100

Participants were asked to indicate the healthcare professional who provided their instructions for ocular pharmaceuticals. All 34 participants provided a response; 73.5% (*n* = 25) reported *Optometrists or Ophthalmologist,* 5.9% (*n* = 2) reported *General or Primary Physician,* 2.9% (*n* = 1) reported *Nurse,* 2.9% (*n* = 1) reported *Pharmacist,* 11.8% (*n* = 4) reported *No one,* and 2.9% (*n* = 1) reported *Self.* (See table 4.3).

Table 4.3

Health Care Professional Who Provide Ocular Pharmaceutical Instructions as Reported by Elderly Patients Currently Being Treated with Ocular Pharmaceuticals

Responses	Male	Female	Gender Not Specified	Frequency	%
Optometrist or Ophthalmologists	10	14	1	24	73.5
General or Primary Physician	1	1	0	2	5.9
Nurse	0	1	0	1	2.9
Pharmacist	0	1	0	1	2.9
No One	1	3	0	4	11.8
Self	1	0	0	1	2.9
Total Responses	13	20	1	34	100

Participants were asked to denote the number of ocular pharmaceuticals they are using as part of ocular treatment. All 34 participants provided a response; 70.6% (*n* = 24) reported using *one* ocular pharmaceutical, 23.5% (*n* = 8) reported using *two* ocular pharmaceuticals, and 5.9% (*n* = 2) reported using *three or more* ocular pharmaceuticals. (See table 4.4).

Table 4.4

Number of Ocular Pharmaceuticals Used in Ocular Treatment as Reported by Elderly Patients Currently Being Treated with Ocular Pharmaceuticals

Responses	Male	Female	Gender Not Specified	Frequency	%
One	9	15	0	24	70.6
Two	3	5	0	8	23.5
Three or more	1	0	1	2	5.9
Total Responses	13	20	1	34	100

Participants were asked to denote the duration of their ocular therapy. All 34 participants provided a response; 0.0% (*n* = 0) reported therapy lasting *less than 1 week*, 8.8% (*n* = 3) reported *1 to 2 weeks*, and 91.2% (*n* = 31) reported *three or more weeks*. (See table 4.5).

Table 4.5

Duration of Ocular Therapy as Reported by Elderly Patients Currently Being Treated with Ocular Pharmaceuticals

Responses	Male	Female	Gender Not Specified	Frequency	%
Less than 1 week	0	0	0	0	0.0
1 to 2 weeks	2	1	0	3	8.8
3 or more weeks	11	19	1	31	91.2
Total Responses	13	20	1	34	100

Participants were asked to indicate the number of eye drops lost and did not make it into the eye(s) per dose when used in ocular treatment. All 34 participants provided a response; 47.1% (*n* = 16) reported *no drops*, 47.1% (*n* = 16) reported *1 to 2 drops*, 2.9 % (*n* = 1) reported *3 to 4 drops*, and 2.9 % (*n* = 1) reported *more than 5 drops.* (See table 4.6).

Table 4.6

Number of Eye Drops Lost and Did Not Make It in to the Eye (s) Per Dose When Used in Ocular Treatment as Reported by Elderly Patients Currently Being Treated with Ocular Pharmaceuticals

Responses	Male	Female	Gender Not Specified	Frequency	%
No drops	8	8	0	16	47.1
1 to 2 drops	5	11	0	16	47.1
3 to 4 drops	0	0	1	1	2.9
More than 5 drops	0	1	0	1	2.9
Total Responses	13	20	1	34	100

Participants were asked to indicate their agreement with the statement, "Instructions on the eye drop box are clear and easy to understand." All 34 participants responded to this question; 61.8% (*n* = 21) reported *strongly agree*, 23.5% (*n* = 8) reported *somewhat agree,* 8.8% (*n* = 3) reported *indifferent,* 2.9% (*n* = 1) reported *somewhat disagree,* and 2.9% (*n* = 1) reported *strongly disagree.* (See table 4.7).

Table 4.7

Instructions on the eye drop box are clear and easy to understand

Responses	Male	Female	Gender Not Specified	Frequency	%
Strongly Agree	7	13	1	21	61.8
Somewhat Agree	3	5	0	8	23.5
Indifferent	1	2	0	3	8.8
Somewhat Disagree	1	0	0	1	2.9
Strongly Disagree	1	0	0	1	2.9
Total Responses	13	20	1	34	100

Participants were asked to indicate their agreement with the statement, "Word choice to explain instructions is clear to understand how to use your eye drops." All 34 participants responded to this question; 67.6% (*n* = 23) reported *strongly agree*, 17.6% (*n* = 6) reported *somewhat agree,* 11.7% (*n* = 4) reported *indifferent,* 2.9% (*n* = 1) reported *somewhat disagree,* and 0.0% (*n* = 0) reported *strongly disagree.* (See table 4.8).

Table 4.8

Word choice to explain instructions is clear to understand how to use your eye drops

Responses	Male	Female	Gender Not Specified	Frequency	%
Strongly Agree	7	15	1	23	67.6
Somewhat Agree	3	3	0	6	17.6
Indifferent	2	2	0	4	11.7
Somewhat Disagree	1	0	0	1	2.9
Strongly Disagree	0	0	0	0	0.0
Total Responses	13	20	1	34	100

Participants were asked to indicate their agreement with the statement, "The use of pictures to illustrate would improve your understanding of the eye drop instructions." All 34 participants responded to this question; 29.4% (*n* = 10) reported *strongly agree*, 17.6% (*n* = 6) reported *somewhat agree,* 32.3% (*n* = 11) reported *indifferent,* 8.8% (*n* = 3) reported *somewhat disagree,* and 11.8% (*n* = 4) reported *strongly disagree.* (See table 4.9).

Table 4.9

The Use of Pictures to Illustrate Would Improve your Understanding of the Eye Drop Instructions

Responses	Male	Female	Gender Not Specified	Frequency	%
Strongly Agree	2	8	0	10	29.4
Somewhat Agree	2	4	0	6	17.6
Indifferent	6	4	1	11	32.3
Somewhat Disagree	1	2	0	3	8.8
Strongly Disagree	2	2	0	4	11.8
Total Responses	13	20	1	34	100

Participants were asked to indicate their agreement with the statement, "The use of a video demonstration would improve your understanding of the eye drop instructions." All 34 participants responded to this question; 17.6% (*n* = 6) reported *strongly agree*, 11.8% (*n* = 4) reported *somewhat agree,* 38.2% (*n* = 13) reported *indifferent,* 8.8% (*n* = 3) reported *somewhat disagree,* and 23.5% (*n* = 8) reported *strongly disagree.* (See table 4.10).

Table 4.10

The Use of a Video Demonstration Would Improve your Understanding of the Eye Drop Instructions

Responses	Male	Female	Gender Not Specified	Frequency	%
Strongly Agree	1	5	0	6	17.6
Somewhat Agree	2	2	0	4	11.8
Indifferent	6	6	1	13	38.2
Somewhat Disagree	1	2	0	3	8.8
Strongly Disagree	3	2	0	8	23.5
Total Responses	13	20	1	34	100

Open-Response Questions Addressing Educational Barriers

Thirteen respondents did not elaborate or provide further detail on the open-response survey questions. Detailed experiences provided by other participants hit keenly on key words and phrases. Ethnographic analysis of their experiences identified two main categories of eye drop users; experienced and inexperienced. Experienced users suggested instruction provided with or without provider interactions were clear and easy to understand. Inexperienced users highlighted instructional needs for first-time eye drop users. Notable suggestions from the participants also included recommendations for product and provider improvement. It was recommended that ocular pharmaceutical could have dosage indicators on the products themselves and if instructional time with the provider could be increased.

Research Question 2: For elderly patients, how can physical barriers be addressed to improve the ability to properly self-administer eye drops as prescribed?

In order to understand how physical barriers could be addressed to improve the ability to properly self-administer eye drops as prescribed; participants were asked to indicate their agreement with the statement, "Instructions in larger font would improve your ability to see and read the instructions clearly." All 34 participants responded to this question; 58.8% (n = 20) reported *strongly agree*, 29.4% (n = 10) reported *somewhat agree,* 5.9% (n = 2) reported *indifferent,* 0.0% (n = 0) reported *somewhat disagree,* and 5.9% (n = 2) reported *strongly disagree.* (See table 4.11).

Table 4.11

Instructions in Larger Font Would Improve your Ability to See and Read the Instructions Clearly

Responses	Male	Female	Gender Not Specified	Frequency	%
Strongly Agree	7	12	1	20	58.8
Somewhat Agree	5	5	0	10	29.4
Indifferent	1	1	0	2	5.9
Somewhat Disagree	0	0	0	0	0.0
Strongly Disagree	0	2	0	2	5.9
Total Responses	13	20	1	34	100

Participants were asked to indicate their agreement with the statement; "Having your health care professional demonstrate how to properly use your eye drops would improve your ability to use eye drops on your own." All 34 participants responded to this question; 38.2% (*n* = 13) reported *strongly agree*, 20.6% (*n* = 7) reported *somewhat agree,* 26.5% (*n* = 9) reported *indifferent,* 8.8% (*n* = 3) reported *somewhat disagree,* and 5.9% (*n* = 2) reported *strongly disagree.* (See table 4.12).

Table 4.12

Having your Health Care Professional Demonstrate how to Properly Use your Eye Drops Would Improve your Ability to Use Eye Drops on your Own

Responses	Male	Female	Gender Not Specified	Frequency	%
Strongly Agree	5	7	1	13	38.2
Somewhat Agree	2	5	0	7	20.6
Indifferent	3	6	0	9	26.5
Somewhat Disagree	2	1	0	3	8.8
Strongly Disagree	1	1	0	2	5.9
Total Responses	13	20	1	34	100

Participants were asked to designate their agreement with the statement; "An eye drop dispenser tool would improve your ability to properly use your eye drops." All 34 participants responded to this question; 20.6% (*n* = 7) reported *strongly agree*, 29.4% (*n* = 10) reported *somewhat agree,* 32.4% (*n* = 11) reported *indifferent,* 11.8% (*n* = 4) reported *somewhat disagree,* and 5.9% (*n* = 2) reported *strongly disagree.* (See table 4.13).

Table 4.13

An Eye Drop Dispenser Tool Would Improve your Ability to Properly Use your Eye Drops

Responses	Male	Female	Gender Not Specified	Frequency	%
Strongly Agree	2	5	0	7	20.6
Somewhat Agree	4	6	0	10	29.4
Indifferent	4	6	1	11	32.4
Somewhat Disagree	2	2	0	4	11.8
Strongly Disagree	1	1	0	2	5.9
Total Responses	13	20	1	34	100

Open-Response Fields Addressing Physical Barriers

Twenty-nine respondents did not elaborate or provide further detail on the open-response survey questions related to experiences with physical barriers to ocular pharmaceutical use. Responses provided from five participants were brief and candid explanations of their physical barriers to ocular pharmaceutical adherence. One participant indicated the need for glasses in order to read the instructions. Another participant indicated he had only one arm and required a stint for their eye-lid. Two participants noted mechanical limitations of carpal tunnel and hand tremors. One participant indicated their Alzheimer's disease as a mental limitation. For this research study each of the experiences provided on physical barriers to ocular pharmaceuticals were unique. These physical barrier experiences demonstrate a considerably wide range of what patients consider a physical barrier or limitation to ocular instillation.

Open-Response Question Addressing Environmental Barriers

Twenty-eight respondents did not elaborate or provide further detail on the open-response survey questions related to experiences with environmental barriers to ocular pharmaceutical use. Two participants indicated that location does impact their ability to use ocular pharmaceuticals, but did not elaborate further. Two participants described their experiences with environmental barriers. One participant described better accuracy instilling eye drops in darkness rather than in the light. The second participant who provided an experience described an important reminder technique based on the time of day for which they administer the ocular pharmaceutical. That technique, is to keep the ocular pharmaceuticals in a convenient and easy to remember location.

Summary

Quantitative and qualitative data analysis demonstrated trends regarding elderly patient adherence to ocular pharmaceuticals and the impact of educational and physical barriers, supported the purpose of this research study. The findings identified that there were elderly patients who believed they were adhering to their ocular therapy. A majority of the participants in this research see a health care professional regularly to receive instructions on how to instill ocular pharmaceuticals. This research uncovered that most elderly patients using ocular pharmaceuticals indicated agreement that there are benefits to addressing areas of educational and physical barriers to ocular pharmaceutical adherence.

Chapter V: Summary, Discussion, and Recommendations

Introduction

The purpose of this study was to assess and evaluate elderly patients' attitudes and behaviors regarding educational and physical barriers and their impact on adherence to ocular pharmaceutical therapy. This research study strived to investigate how these two types of barriers contributed to low adherence rates for elderly patients undergoing ocular pharmaceutical therapy. The following research questions were examined in this research study:

1. For elderly patients, how can the educational barrier of a lack of understanding of how to properly instill ocular pharmaceuticals be addressed and mitigated?
2. For elderly patients, how can physical barriers be addressed to improve the ability to properly self-administer eye drops as prescribed?

Summary

This research study included thirty-four respondents who were ages 65 years or older, currently undergoing ocular therapy, and being treated with a specific ocular pharmaceuticals- eye drops. The timeframe in which this study was conducted was during the fall 2014 through the spring 2015 semesters. Respondents by gender were 38.2% (n= 13) male, 58.8% (n=20) were female, and 2.9% (n=1) who did not indicate a gender. The mean age of the eligible respondents was 87.65 years of age and range of ages of the respondents was 65 years to 99 years. Data were collected for this research study using a survey instrument. A printed version was distributed in-person at the Edina Senior Center and the Burnsville Center and an online version distributed by Zoomerang

™ survey tool. The survey questions were designed and tested in a pilot study to gather data about elderly patient's attitudes, behaviors, and experiences regarding educational and physical barriers and their impact upon ocular pharmaceutical adherence.

Discussion

The population size of eligible respondents for this research study was reasonable provided the noted limitations. An assumption made by this researcher was that a higher percentage of ocular pharmaceutical users would be among the elderly population. Of the 135 respondents who met the age inclusion criteria (of 65 years of age and older) only 61 noted they were treating an eye condition, and of those 61 only 34 used ocular pharmaceuticals as part of their treatment of an eye condition or eye conditions. Therefore the sample population of respondents who are actually treating and ocular condition with eye drops was 27.2%.

A survey question asked participants to indicate the number of eye drops lost and did not make it into the eye(s) per dose when used in ocular treatment. Forty-seven and one-tenth percent (n = 16) of respondents reported no drops were lost and 47.1% (n = 16) reported 1 to 2 drops were lost, and just 2.9 % (n = 1) reported loosing more than 5 drops. However, several studies reviewed that recorded greater loss than that reported by patients. Hennessy, Katz, Covert, Protzko, and Robin (2010) observed glaucoma patients instilling their ocular pharmaceuticals and found only 71% percent of subjects were able to get a single drop onto the eye following instructions. This indicates that self-reporting of loss by a patient may be less than the amount lost in practice.

Educational barriers

The responses collected from respondents treating an ocular condition with ocular pharmaceuticals indicated strong agreement that reducing educational barriers was beneficial. Participants described their desire to address educational barriers with eye care providers and with ocular pharmaceutical products. One respondent stated literacy concerns and the use of illustrations as helpful. In regards to the statement, "The use of pictures to illustrate would improve your understanding of the eye drop instructions." 29.4% (n = 10) of study participants reported *strongly agree* and 17.6% (n = 6) reported *somewhat agree* suggesting that pictographic instructions would improve understating of instillation.

Findings from this study about the educational experiences of the respondents exposed a desire for elderly patient education for first time ocular pharmaceutical users and increasing time with providers for education on instillation. Shea (2006, p.7) also promoted this suggestion for increased health education, as "during the medication education phase of the appointment can significantly improve adherence." This study supports the desire for increased health education opportunities for ocular pharmaceuticals to improve elderly patient adherence to this class of medications.

Physical barriers

The responses collected from respondents treating an ocular condition with ocular pharmaceuticals expressed a strong agreement with improving upon physical barriers as a beneficial idea. There was strong support for larger font provisions, 58.8% (n = 20) reported *strongly agree* and 29.4% (n = 10) reported *somewhat agree* with the survey question statement, "Instructions in larger font would improve your ability to see and

read the instructions clearly." Reducing this burdening factor has the potential to impact medication adherence. Shrank, Avorn, Rolon, and Shekelle, (2007) support label formatting such as the use of larger fonts, lists, headers, and white space, using simple language and logical organization to improve readability and comprehension. Findings from this study also demonstrate the research study participants' interest in addressing physical barriers to instillation with dispenser aides. Specifically, 20.6% (n = 7) participants reported *strongly agree* and 29.4% (n = 10) reported *somewhat agree* with the statement, "An eye drop dispenser tool would improve your ability to properly use your eye drops." The desire to improve instillation shows that elderly patients undergoing ocular pharmaceutical therapy are responsive to using an ocular pharmaceutical dispensing tool. This level of agreement by the research study population would suggest the need to research further and present this as a quality of healthcare need to eye care providers, other healthcare professionals dispensing ocular pharmaceuticals, and the manufacturing producers of ocular pharmaceuticals.

This study also found through participant experiences that a variety of physical conditions that are not directly related to ocular conditions were self-reported as physical barriers. Respondents in this research study experienced hand tremors, Alzheimer's disease, and carpal tunnel as physical barriers. One respondent indicated he is one-handed and required the use of a stump to hold eyelid. Each of these experiences indicates that ocular therapy is a unique treatment and providers and patients should work together to support successful treatments that overcome physical barriers. From the experiences evaluated in this study, adjustments could range from needing glasses to read instructions

to the use of a dispenser aid or stump. However, treatment options should be discussed and evaluated to suit the needs of each patients agreed upon ocular therapy plan.

Limitation and Delimitations

A limiting factor to in-person data collection was the timeframe. The Edina Senior Center and the Burnsville Senior Center are open primarily during daytime hours. During in-person table events collecting survey responses during social hour activities was more successful than planned structured activities at both senior centers. Table events during the social activities resulted in a higher volume of participants willing to participate in the research study. Those arriving at the senior center for an activity were able to leisurely talk to the researcher about the study and take the survey. During structured activity times, visitors of the senior centers did not want to stop at the table and declined interested in talking to the researcher. Online survey collection had a notably higher volume of respondents. Several factors may have contributed to the success of this survey collections method such as, elderly users of computers and Internet may be more technologically savvy than their peers. Additionally, the online survey participants had the liberty of taking the survey when there was a convenient time during the two-week timeframe in which the survey link was active.

Another limiting factor was the sample population size of eligible participants. Establishing a partnership with an eye care clinic may result in a higher concentration of persons who are treated with ocular pharmaceuticals. Another way to recruit more eligible participants is to expand the inclusion criteria to include responses of non-ocular pharmaceutical users who are treating an eye condition to gather an alternative perspective on instillation. Increasing both the time available for data collection and the

eligible number of participants would provide more viable data to investigate ocular pharmaceutical adherence and the impact of educational and physical barriers.

Recommendations for Health Education Profession

Findings from this study provided data regarding attitudes, behaviors, and experience about elderly patient adherence to ocular pharmaceuticals and the impact of educational and physical barriers. These findings suggest there is a gap in the health education profession of the need for health educators and professionals to provide educational opportunities to elderly ocular therapy patients. Findings of this study demonstrate elderly participants sampled 38.2% (n = 13) reported strongly agreeing with the statement, "Having your health care professional demonstrate how to properly use your eye drops would improve your ability to use eye drops on your own." In order to increase the knowledge base of elderly patients, it is essential to integrate this information into the patient education conversations at ocular therapy appointments.

Revisiting the Health Belief Model used to support this study, this model will continue to aid health educators in identifying the perceived barriers to ocular pharmaceutical adherence and the equally important benefits of instilling ocular pharmaceuticals appropriately. As a supportive model, the Health Belief Model has proven suitable in this study and applied to developing data collection methods and strategies to improve ocular pharmaceutical education conversations between elderly patients and providers.

Recommendations for Future Research

Results of this research study indicate a need to gather data from a broader sample of elderly patients using ocular pharmaceuticals. This would enrich the knowledge base

available on educational and environmental barriers to ocular pharmaceutical adherence and increase the validity of findings from the attitudes, behaviors, and experiences.

A recommendation this study makes is to increase the amount of detailed experiences elderly patients will share regarding their attitudes and behavior towards educational and physical barriers to using ocular pharmaceuticals. This could be an adjustment to data collection instruments. Re-formatting and repurposing of the open response questions in the form of a focus group or conducting interviews may elicit more detailed and descriptive responses in order to achieve the objective of gaining more knowledge than what is available. Using additional health education research techniques to investigate further would allow for deeper insight into educational and physical barriers to ocular pharmaceutical adherence.

Additionally, the need to investigate possible interventions is evident from this study of elderly patient adherence to ocular pharmaceuticals and the impact of educational and physical barriers. Expanding on each of the targeted survey questions to gain more detail regarding the educational and physical barriers. Follow up needs assessments built from the questions focused on educational barriers could assess the impact of interventions focusing on video and illustrative instructions on elderly patient ocular pharmaceutical adherence. Follow up needs assessments built from the questions focused on physical barriers could assess the impact of interventions focusing on larger font formatting or the use of dispenser aides on elderly patient ocular pharmaceutical adherence.

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Appendices

Appendix A: Literature Review Matrix

Lucky M. Wagner
Literature Review Matrix
3 December 2014

Research Questions:
1. For elderly patients, how can the educational barrier of a lack of understanding how to properly instill ocular pharmaceuticals be addressed and improved upon?
2. For elderly patients, how can physical barriers be addressed to improve the ability to properly self-administer eye drops as prescribed?

Fundamental Information				
No.	**Author (s), title, name of journal**	**Year of publication**	**Purpose of paper or source document**	**APA Citation**
1	Riffenburgh, R.S. Doctor-patient relationship in glaucoma therapy. Archives of Ophthalmology.	1966	Applying diagnostic and evaluative techniques as functions of treatment.	Riffenburgh, R.S. (1966) Doctor-patient relationship in glaucoma therapy. *Archives of Ophthalmology 75(2), 204-206.*
2	Bloch S, Rosenthal AR, Friedman L and Caldarolla P. Patient compliance in glaucoma. British Journal of Ophthalmology.	1977	Are noncompliers distinguishable from compliers?	Bloch S, Rosenthal AR, Friedman L and Caldarolla P (1977). Patient compliance in glaucoma. *British Journal of Ophthalmology 61: 531-534.*
3	Becker, M. H., & Maiman, L. A. Strategies for enhancing patient compliance. Journal of community health.	1980	Practical interventions with demonstrated efficacy in improving patient adherence	Becker, M. H., & Maiman, L. A. (1980). Strategies for enhancing patient compliance. *Journal of Community Health*, *6(2), 113-135.*
4	Zimmerman T.J.and Zalta A.H. Facilitating patient compliance in glaucoma therapy. Survey of Ophthalmology	1983	Handling, storing, and actual administering aspects of eye drops	Zimmerman, T.J. and Zalta A.H. (1983). Facilitating patient compliance in glaucoma therapy. *Survey of Ophthalmology 28: 252-257.*
5	Janz, N. K., & Becker, M. H. The health belief model: A decade later. Health Education & Behavior. Journal of phsychosomatic research.	1984	Describes and provides examples of the health belief model.	Janz, N. K., & Becker, M. H. (1984). The health belief model: A decade later. Health Education & Behavior. *Journal of Psychosomatic Research.* 47 (6), 555-567. http://dx.doi.org/10.1016/S0022-3999(99)00057-4

6	Morisky, Donald E. ScD; Green, Lawrence W. DrPH; Levine, David M. MD. Concurrent and Predictive Validity of a Self-reported Measure of Medication Adherence. Medical Care.	1986	Adherence to the medical regimen continues to rank as a major clinical problem in the management of patients	Morisky, Donald E. ScD; Green, Lawrence W. DrPH; Levine, David M. MD. (1986). Concurrent and Predictive Validity of a Self-reported Measure of Medication Adherence. *Medical Care*. (24) 1.
7	Murphy, W. F. Not an article. Invention patent.	1987	Device for administering eye drops from an eye dropper bottle comprising of a frame	Murphy, W. F. (1987). [U.S. Patent No. 4,685,906]. Washington, DC: U.S. Patent and Trademark Office.
8	Rosenstock, I. M., Strecher, V. J., & Becker, M. H. Social learning theory and the health belief model. Health Education & Behavior.	1988	This article attempts to show how explanatory factors may be related, and in so doing, posits a revised explanatory model which incorporates self-efficacy into the Health Belief Model.	Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education & Behavior. 15*(2), 175-183.
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17	Bonnie L Svarstada, Betty A Chewninga, Betsy L Sleath, Cecilia Claessonc	1999	Patient compliance; Drug utilization; Measurement; Questionnaire	Svarstada, B.L., Chewninga, B.A., and Claessonc, C. (1999). The brief medication questionnaire: A tool for screening patient adherence and barriers to adherence. *Patient Education and Counseling. 37* (2), 113-124.doi:10.1016/S0738-3991(98)00107-4
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43	Lacey, J. and Cate, H. Barriers to adherence with glaucoma medications: a qualitative research study. Eye London.	2008	Obstacles and motivations for adherence with glaucoma medication	Lacey, J. and Cate, H. (2008). Barriers to adherence with glaucoma medications: a qualitative research study. *Eye London. 23(4), 924-932.* doi: 10.1038/eye.2008.103. Epub 2008 Apr 25.
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45	Dietlein, T. S., Jordan, J. F., Lüke, C., Schild, A., Dinslage, S., & Krieglstein, G. K. Self‐application of single‐use eyedrop containers in an elderly population: comparisons with standard eyedrop bottle and with younger patients. Acta ophthalmologica.	2008	To test whether patients' aged ≥80 years can safely and successfully apply eyedrops from a single-use eyedrop container without support, and to compare the results with those of younger patients using single-use containers and older patients using standard eyedrop bottles.	Dietlein, T. S., Jordan, J. F., Lüke, C., Schild, A., Dinslage, S., & Krieglstein, G. K. (2008). Self‐application of single‐use eyedrop containers in an elderly population: comparisons with standard eyedrop bottle and with younger patients. *Acta Ophthalmologica, 86*(8), 856-859.
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60	Grissinger, M. Physical Environments That Promote Safe Medication Use. Pharmacy and Therapeutics.	2012	In 2010, the U.S. Pharmacopeia (USP) published a new chapter on environments that promote the safe use of medications	Grissinger, M. (2012). Physical Environments That Promote Safe Medication Use. *Pharmacy and Therapeutics*. 37 (7): 377–378. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3411211/

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64	Centers for Disease Control and Prevention. Medication Adherence. Power Point.	2013	PowerPoint presentation on the social and economic impact of patient noncompliance to medication therapy	Centers for Disease Control and Prevention. (2013). *Medication Adherence* [Power Point Slides]. Retrieved from http://www.cdc.gov/primarycare/materials/medication/docs/medication-adherence-01ccd.pdf.
65	National Community Pharmacists Association. Medication Adherence in America: A National Report.	2013	2013 National (U.S.) Report card. Discussion of group differences and predictors of key factors to adherence.	National Community Pharmacists Association. (2013). *Medication Adherence in America: A National Report*. Retrieved from http://www.ncpanet.org/pdf/reportcard/AdherenceReportCard_Abridged.pdf
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70	Hopper, T. Mosby's Pharmacy Technician. Principles & Practice.	2014	Pharmacy perspective for medication adherence	Hopper, T. (2014). *Mosby's Pharmacy Technician. Principles & Practice.* (3rd ed.). Mosby. St. Louis, MO.
71	National Eye Institute. Age related eye diseases	N.D.	A listing of eye conditions recognized in the United States	National Eye Institute. (n.d.). Age related eye diseases. Retrieved from https://www.nei.nih.gov/healthyeyes/aging_eye.asp.
72	Gardner, T., Knoll, R.K., Dunn, J., and Dacus, C. Website listing. Compliance in elderly patients.	N.D.	List of physical barriers and functional barriers.to provide information for elderly patients regarding the hazards of noncompliance and the benefits of compliance.	Gardner, T., Knoll, R.K., Dunn, J., and Dacus, C. (n.d.). Compliance in elderly patients. Retrieved from http://www.uams.edu/compliance/barriers.htm

Variables			**Subjects**		**Data**			
No.	**Dependent**	**Independent**	**# Of Subjects**	**Subject characteristic**	**Sample design**	**Source or instrument**	**Year data collected**	**Comments**
1	Satisfaction of glaucoma treatment.	Skill, medication, provider, patient	NA	Glaucoma	Commentary on the influences on the doctor-patient relationship.	NA	NA	Editorial article in this journal.
2	Adherence to medical advice.	Interrelated psychosocial factors	52 patients selected; 40 patients participated	Chronic glaucoma	Regional- by inclusion criteria (must have diagnosis)	Counseling and research interviews	1976	
3	Patient adherence to medication	Interventions strategy	NA	NA	Presentation of published reports on promising strategies.	Researcher review of practical interventions	NA	Suggesting tailored approaches

4	Success of prescribed therapies	Aspects of eye drop instillation	253 glaucoma patients	Patients at two regional, but geographically distinct glaucoma specialists	2-page questionnaire current use of eye drops	Questionnaire	1982	
5	NA	NA	NA	NA	NA	NA	NA	
6	Adherence to medical advice.	Patients who followed an 18-month education plan.	Not specified.	High blood pressure.	Intervention.	Reviews the psychometric properties and tests the concurrent and predictive validity of a structured four-item self-reported adherence measure	1981-1985	The scale address barriers to medication-taking and permit the health care provider to reinforce positive adherence behaviors.
7	NA	NA	NA	NA	NA	NA	NA	US4685906 A. Two images are available of the device.
8	Health motivation	Self-efficacy	NA	Models explaining predicting and influencing behavior	Explanatory factors may be related, and in so doing, posits a revised explanatory model which incorporates self-efficacy into the Health Belief Model.	NA	NA	Suggest more effective behavioral interventions than have hitherto been available to health educators.
9	NA	NA	NA	NA	NA	NA	NA	Focused on how personal factors that contribute importantly to this dynamic interaction can be altered to improve the level of organizational functioning.

10	Patient success rate of instilling eye drop as prescribed	Ability capability	200 patients	Eye Out patients Department at Aberdeen Royal Infirmary	Questionnaire, ability test, eye drop bottle testing	Focus groups and by clinical examination.	1989	Opticare compliance aid developed
11	Successful instillation of eye drop application	Elderly patients prescribed eye drops	43 patients	Outpatients 75 years or more	Questionnaire and demonstrated their technique in eye-drop application.	Individual questionnaires and by clinical examination	Not specified	Few patients had been prescribed aids or appliances to improve their eye-drop application technique.
12	Behavior change	Health beliefs	Not specified	Educated, upper-middle-class population age 50 to 89 years.	Examined the relationship between self-reported behavior change	Self-reported individual questionnaires.	1993	These results suggest that increasing age does not diminish the relation between health beliefs and health behaviors. Health promotion campaigns aimed at older adults should strive to reduce confusion to improve health behavior.
13	NA	NA	NA	NA	NA	Eye drop dispensing device	NA	Two images available for the device.
14	Patient adherence to medication.	The number of medications a patient is taking.	Not specified.	Elderly patients' noncompliance with medication regimens.	Literature review.	Various references.	Not specified.	
15	NA	NA	NA	NA	Assist in squeezing the bottles or positioning the drop	NA	NA	Brand name tools: Opticare, Autosqueeze, Autodrop (images on p. 928)
16	NA	NA	NA	Elderly patients' noncompliance with	A descriptive analysis of the literature	A MEDLINE ® search of the	1962 to 1997	Clear associations have been established

				medicatio n regimens		literature		between elderly patients' medication adherence and race, drug and dosage form, number of medications, cost of medications, insurance coverage, and physician-patient communicati on.
17	Brief Medicat ion Questio nnaire (BMQ) results	The patients	20 patients	Patients who need assistance with their medicatio ns	A five-item Regimen Screen that asks patients how they took each medication in the past week, a 2-item Belief Screen that asks about drug effects and bothersome features, and a 2-item Recall Screen about potential difficulties remembering.	Questionna ire	1998	Self-report tools for monitoring adherence can be useful in identifying patients who need assistance with their medications, assessing patient concerns, and evaluating new programs.
18	Patient adheren ce rates.	Patients were divided by necessity and by concern.	324 Patients.	Four chronic illness groups (asthma, renal, cardiac, and oncology) .	Patients ranked beliefs by topic area. Study used questionnaires to collect responses.	Cross-sectional study.	1998	Considerable variation in reported adherence and beliefs about medicines within and between illness groups.
19	NA	NA	NA	NA	NA	NA	NA	

20	Education program effectiveness	Patients' glaucoma knowledge, understanding of compliance and health motivation	100 persons	Diagnosis of primary open angle glaucoma	Questionnaire	Questionnaire	1998	The interactive program and the didactic presentation were statistically the same
21	NA	NA	NA	NA	NA	Medication adherence scale.	NA	For provider use.
22	Individualize interventions for promoting medication taking.	Organization of the MAM may facilitate health care providers' abilities to improve medication adherence.	NA	Not specified	The three core concepts identified in the model are: (a) Purposeful Action, (b) Patterned Behavior, and (c) Feedback.	NA	NA	The MAM was structured with the idea that two types of nonadherence contribute to inconsistent medication taking, the intentional decision to miss medications, and the unintentional interruptions that cause medications not to be taken. The three core concepts identified in the model are: (a) Purposeful Action, (b) Patterned Behavior, and (c) Feedback.
23	Subject responses	Situational obstacles	71 patients	Diagnosis of glaucoma	Structured interviews recorded on audiotapes	Hierarchical cluster analysis from interviews	2000-2002	Taxonomy

24	NA	NA	NA	Minority groups whose first language is not the language of the healthcare system.	Barriers to the access of medication information by ethnic minorities include second language issues and cultural differences due to different health beliefs, together with the low socio-economic status often seen among ethnic minorities.	Searched electronic databases and printed scientific journals focusing on (ethnic) minorities, health and/or (intercultur al) communica tion. Also a discussion group for references.	Not speci fied	Only a few articles on intercultural communicati on on medication or pharmacy information and one article on the improvement of intercultural communicati on in the pharmacy. Barriers to the access of medication information by ethnic minorities include second language issues and cultural differences due to different health beliefs, together with the low socio-economic status often seen among ethnic minorities.
25	Cost related drug adheren ce.	Insurance coverage.	19581 Medicare members.	Participan ts age sixty-five and older who were enrolled in Medicare in 2000.	Four-fifths of the interviews were conducted by telephone. The rest in person.	(2000) of the Health and Retirement Study (HRS), an ongoing longitudina l survey of community -dwelling older Americans.	2000	This poor adherence tended to be more common among beneficiaries with no or partial medication coverage and was associated with poorer health and higher rates of hospitalizati on.

26	Medication adherence rates.	Behavioral, educational, and combined interventions.	10 subjects per intervention group were included. 61 articles were evaluated.	Homogenous cohort patients	Randomized controlled trials were studied.	A literature search was performed with MEDLINE, International Pharmaceutical Abstracts, PsychLIT, ERIC, and EMBASE.	1966 to December 2000.	No single strategy appeared to be best.
27	NA	NA	NA	NA	NA	NA	NA	Five dimensions developed by the WHO. Cited by several studies.
28	Subject responses.	Information concerning dosing of their medicines.	500 patients and prescribers.	Glaucoma therapy.	Interviews by telephone	Interview.	2000-2003	
29	NA	NA	134 articles included.	NA	Abstracts of identified articles were assessed by at least two reviewers and the full articles were assessed by one reviewer and checked by at least one other reviewer. Data on the design, analysis and relevant findings were extracted.	Six electronic databases were searched using the following categories of search terms: health care professionals, patients/consumers, medicine-taking/prescribing and communication.	Studies published between 1991 and 2000 were included	
30	NA	NA	NA	NA	Review design and physical characteristics of dropper tip and bottle, physico-chemical properties of the solution, and the manner the patient dispenses drops	NA	NA	In this review, the technical, pharmaceutical, and therapeutic aspects of eye drop formation and delivery are presented.

31	NA	NA	86 Studies.	Self-report versus non self-report studies.	A literature search was conducted to identify published reports in which self-report and non-self-report measures of adherence were used within the same study.	The concordance of measures within each study was categorized as high, moderate, or low.	2004	
32	NA	NA	NA	NA	Review of interventions designed to address non-adherence to therapeutic regimens.	Literature review. Various sources. Queen's University in Belfast, Northern Ireland.	NA	No consensus in the literature that age is a predictor of poor adherence.
33	NA	NA	NA	NA	NA	National initiative by the Case Management Society of America to train case managers in psychosocial behavioral change and apply adherence interventions through a set of evidence-based guidelines	NA	Adherence, formerly referred to as compliance, is a patient-centered term. It suggests that patients carry out and maintain certain behaviors, such as taking medications, after making an informed choice in a supportive environment.
34	NA	NA	NA	NA	NA	Review of conducted studies.	NA	Good review of tools available.
35	NA	NA	NA	NA	NA	NA	NA	Website designed to help elderly outpatients.
36	NA	NA	NA	NA	NA	NA	NA	Editorial article. Recommendations to enhance adherence to medications.

37	Older adults' medication adherence.	Personal and cultural beliefs.	14 studies.	Adults who are often prescribed medications for age-related chronic disorders.	The majority of the studies in the review evaluated older adults' medication adherence by self-report and used cross-sectional designs and convenience samples.	Systematic literatures searches using ten databases. A review of research studies published in journals across different disciplines.	NA	
38	NA	NA	NA	NA	NA	NA	NA	
39	NA	NA	NA	NA	NA	NA	NA	
40	Subject responses.	Medication adherence questions.	NA	National stratified random sample of community-dwelling Medicare members 65 years and older.	Nationwide cross-sectional survey.	Factor analysis of survey responses.	2005-2006	
41	Effect size of interventions and clinical adherence.	Informational, behavioral, and/or social, or combined interventions.	37 eligible trials.	Patients with chronic medical conditions.	Study characteristics and results for adherence and clinical outcomes were extracted.	Published Randomized controlled trials	January 1967 to September 2004	
42	NA	NA	NA	Generalized eye drop use	NA	National Institute of Health	NA	Illustrative instructions
43	NA	NA	Not specified.	Participants had moderate/severe glaucoma diagnosed for >1 year and prescribed 2 or more medications.	Qualitative methodology investigated aspects of adherence.	Recruited patients attended focus groups or had a home-based semi-structured interview.	2006	
44	NA	NA	NA	NA	NA	NA	NA	Theoretical support and definitions

45	Patient success rate of ability to instill eye drop as instructed.	Eye drop container type. Control group: applied drops from single-use eye drop containers. Group B: traditional eye drop bottle.	44 patients.	Patients aged ≥80 years who had no physical or mental conditions hindering self-application of eye drops	Two investigators, who documented practical problems during the procedure in a checklist, observed patients.	Randomized controlled study	Not specified.	Frequency of problems during opening and self-application of single-use eye drop containers in the study group showed an inverse correlation to visual acuity in the better eye and previous experience with this kind of eye drop container.
46	NA	NA	NA	Measuring adherence in each study	Articles were selected if they reported an uncompounded RCT of an intervention to improve adherence with prescribed medications, measuring both medication adherence and treatment outcome, with at least 80% follow-up of each group studied and, for long-term treatments, at least six months follow-up for studies with positive initial findings.	Searches of *The Cochrane Library,* MEDLINE, CINAHL, EMBASE, International Pharmaceutical Abstracts (IPA), PsycINFO (all via OVID) and Sociological Abstracts (via CSA) i with no language restriction.	Jan-07	
47	NA	NA	63 studies.	Older adults > 60 years of age who are self-medicating.	Literature review.	Computerized database searches, journal hand searches, and ancestry searches.	1977-2005	Low medication adherence rates among some elderly contributes to inadequate pharmacolog

								ical management of illnesses
48	NA	NA	NA	NA	Review of evidence based interventions.	Review of conducted studies.	2005	This is a handbook.
49	Patient adherence medication rates.	Watched an educational video, reviewed current barriers to drop-taking and possible solutions with a study coordinator, received regular phone call reminders, and had audible and visible reminders.	66 patients.	Patients with glaucoma being treated with a prostaglandin analog in one or both eyes.	Randomized controlled study.	Intervention.	November 2006 and June 2007	
50	NA	NA	NA	American adults.	Articles were grouped and summarized into three broad categories (nonadherence, health literacy, and communicating health information to patients), with an emphasis on the use of written patient information in health care and pharmacy practice in particular.	Searches of Medline, PubMed, and International Pharmaceutical Abstracts databases were conducted using one or more of the following terms adherence/nonadherence, compliance/noncompliance, printed/written information, literacy, patient education, communication, and health literacy.	2008	

51	Patient adherence rates.	Participants were divided into a group with High Cognitive Function (HCF) or Low Cognitive Function (LCF) based on their scores on the ADAS-Cog.	38 patients.	Patients aged 65 years and older.	This was a cross-sectional study of the ability of independently living healthy elders to follow a medication regimen.	Adherence was measured using an electronic 7-day pillbox.	2009	
52	Outcome of conferences.	Educational meetings alone or combined with other interventions.	81 trials involving more than 11,000 health professionals.	Professionals' conference.	Randomized controlled trials of educational meetings that reported an objective measure of professional practice or healthcare outcomes.	Searching the Cochrane Effective Practice and Organization of Care Group Trials Register and pending file.	1999-2006	Educational meetings alone or combined with other interventions can improve professional practice and healthcare outcomes for the patients.
53	Effectiveness of interventions.	Tailored interventions.	26 studies.	Randomized controlled trials (RCTs) of interventions.	Meta-regression to compare interventions tailored to address identified barriers to change with either no interventions or an intervention(s) not tailored to the barriers.	Database searches without language restrictions, from inception until August 2007: MEDLINE, EMBASE, CINAHL, BNI and HMIC.	2007-2009	Interventions tailored to prospectively identified barriers are more likely to improve professional practice than no intervention or dissemination of guidelines.
54	NA	NA	NA	NA	NA	Various references	NA	Good definitions and tools for educators
55	NA	NA	NA	NA	NA	NA	NA	Recommendation to share medication management responsibilities following the patient-centered medical home model of care

56	Eye drop administration.	Subjects with glaucoma or retinal diseases.	409 subjects (205 glaucoma, 204 retina).	Glaucoma or retinal diseases with visual acuity of 20/60 or worse in 1 eye, significant field loss, or both.	Study was divided by diagnosis.	Recorded clinical examination.	2010-2011	Both groups wasted drops, contaminated bottles, and had inaccurate perception of their abilities.
57	NA	NA	NA	Elderly patients (i.e., ≥65 years of age) in the United States.	Nonsystematic reviews were excluded, as were studies that focused specifically on people who were homeless or substance abusers, or patients with psychotic disorders, tuberculosis, or HIV infection, because of the unique circumstances that surround medication adherence for each of these populations.	The PubMed and PsychINFO databases were searched for articles published in English between January 1998 and January 2010	1998-2010	Described "predictors," "facilitators," or "determinants" of medication adherence.
58	NA	NA	NA	NA	NA	NA	NA	
59	NA	NA	NA	NA	NA	Review of other studies.	NA	Tips for the pharmacist include demonstrating proper instillation technique each time a patient presents a new prescription, and observe the patient applying drops. Pharmacists should also remind patients to include eye

								drops on their medication lists, and insist that they need them if they are hospitalized
60	Safe medication use.	Illumination, interruptions and distractions, sound and noise, physical design and organization, and medication safety zones.	NA	NA	The reports described in this column were received through the ISMP Medication Errors Reporting Program (MERP). Errors, close calls, or hazardous conditions may be reported on the ISMP Web site (www.ismp.org) or communicated directly to ISMP by calling 1-800-FAIL-SAFE or via e-mail at ismpinfo@ismp.org.	The reports described in this column were received through the ISMP Medication Errors Reporting Program (MERP). Errors, close calls, or hazardous conditions may be reported on the ISMP Web site (www.ismp.org) or communicated directly to ISMP by calling 1-800-FAIL-SAFE or via e-mail at ismpinfo@ismp.org.	Not specified	Standards are provided in five key areas—illumination, interruptions and distractions, sound and noise, physical design and organization, and medication safety zones.
61	The ability to assess concordance.	Patients who were administered the MedAdhIR-ST questions and those given the MAQ questions.	Not specified.	Community-dwelling elderly population.	A prospective, observational pilot study comparing the reliability and validity of the MedAdhIR-ST compared against the Medication Adherence Questionnaire (MAQ).	Questionnaire. Exploratory factor analysis.	2012	Accepted in 2014.

62	Patient adherence to medication.	Living with drugs, taking medication, belief about drugs and relationship with health professionals.	NA	People aged 65 or more and with chronic illness.	Data was collected by two focus groups. The content of discussion was analyzed from verbatim transcript and identifying categories and sub-categories emerged, leading to the construction of a diagram analysis.	Focus groups.	2011-2012	The elderly suggest that the relationship with health professionals is essential in medication management and they reported that the information given by the nurse during consultation is very important.
63	NA	NA	NA	NA	NA	NA	NA	
64	NA	NA	NA	NA	NA	Various references.	NA	CDC calls out educational pointers.
65	NA	NA	NA	NA	Annual report	Various references	NA	Prepared by the national community of pharmacists association. Americans had an overall compliance score of a C+.
66	Patient adherence medication rates.	Patients receiving patient centered health promotion approach.	NA	27 new and established patients receiving glaucoma treatment.	Interviews.	The interviews were transcribed and then analyzed thematically.	2012	Nine categories of health education needs were identified.
67	NA	NA	NA	General populations of eye drop users and eye care providers.	Discussion and contribution by health professionals working in optometry, ophthalmology, medicine, pharmacy, and development	Various references. Global health conference.	NA	Good topic discussion forum.

68	Particip ant respons e.	Movement from periodic to continuous operation.	Unknown-some cultures provided group responses.	Māori, Pacific and Asian population s residing in New Zealand.	Disproportion ate area sampling and a dual frame design.	Use of core questions with rotating topic modules to improve flexibility in survey content; and opportuniti es for ongoing improveme nts and efficiencies , including linkage to administrat ive datasets.		Applicable for survey design. Not specific to any health condition.
69	NA	NA	NA	NA	NA	NA	NA	
70	NA	NA	NA	NA	NA	Various references	NA	Good for definitions and utilization rates.
71	NA	NA	NA	NA	NA	Various references	NA	
72	NA	NA	NA	NA	NA	NA	NA	University of Arkansas Medical Sciences

Appendix B: Approval Institutional Review Board

February 24, 2015

Dear Judith Luebke:

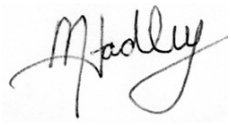
Re: IRB Proposal entitled "[720717-4] Elderly patient adherence to ocular pharmaceuticals. Impact of educational and physical barriers."
Review Level: Level *[I]*

Your IRB Proposal has been approved as of February 24, 2015. On behalf of the Minnesota State University, Mankato IRB, we wish you success with your study. Remember that you must seek approval for any changes in your study, its design, funding source, consent process, or any part of the study that may affect participants in the study. Should any of the participants in your study suffer a research-related injury or other harmful outcome, you are required to report them to the Associate Vice-President of Research and Dean of Graduate Studies immediately.

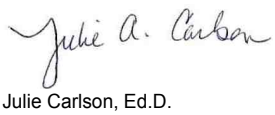
The approval of your study is for one calendar year less a day from the approval date. When you complete your data collection or should you discontinue your study, you must submit a Closure request (see http://grad.mnsu.edu/irb/continuation.html). Please include your IRBNet ID number with any correspondence with the IRB.

The Principal Investigator (PI) is responsible for maintaining signed consent forms in a secure location at MSU for 3 years. If the PI leaves MSU before the end of the 3-year timeline, he/she is responsible for following "Consent Form Maintenance" procedures posted online (see http://grad.mnsu.edu/irb/storingconsentforms.pdf).

Sincerely,



Mary Hadley, Ph.D.
IRB Coordinator



Julie Carlson, Ed.D.
IRB Co-Chair

Appendix C: In-Person Consent Form

Privacy and consent

- **Purpose**: The purpose of this study is to learn how patients who are using eye drops to treat eye conditions perceive the educational and physical barriers to effective use. You must currently be treated for an eye condition to take part in this study.
- **What we will ask**: If you agree to be a participant in this study, we will gather your responses to the survey questions. The survey questions will take about 5 minutes to complete. The open response questions about treatment of your eye condition, the educational or instructional barriers, physical limitations, the environment, and how you feel this impacts your ability to use eye drops will take about an additional 5 minutes to complete.
- **Risks:** There is the risk that you could find a few of the questions about your eye conditions to be sensitive. I do not anticipate any risks to you participating in this study other than risks experienced in daily life.
- **Benefits**: There are no benefits to you.
- **Compensation**: There is no compensation for your participation.

- **Confidentiality:** The responses from this study will remain confidential. Any publicly available report will omit any information that could make it possible for you to be identified. Responses will be stored in a password-protected file accessible only by the researchers.
- **Voluntary Participation:** Participation is this study is voluntary. Any questions that you do not want to answer may be skipped. You are free to leave the study at any time without prejudice.
- **Questions:** This research project is being directed by Dr. Judith Luebke. You can contact Dr. Luebke at 507-389-5938 or judith.luebke@mnsu.edu about any concerns you have about this project. You also may contact the Minnesota State University, Mankato Institutional Review Board Administrator, Dr. Barry Ries, at 389-1242 or barry.ries@mnsu.edu with any questions about research with human participants at Minnesota State University, Mankato.

Statement of Consent: I have read the above information and have received answers to any questions I asked. I consent to take part in the study.

Participants should initial each page.

Initials:____

Submitting the completed survey will indicate your informed consent to participate.

Printed Name_____

Your Signature_____ Date _____

The researchers will keep this consent form for a minimum of three years beyond the end of the study. You may request a copy of this form for your records.

Thank you, for your response and participation.

Appendix D: Online Consent Form

ONLINE/ANONYMOUS SURVEY CONSENT

You are requested to participate in research supervised by Dr. Judith K. Luebke on elderly patient adherence to ocular pharmaceuticals and impact of educational and physical barriers. This survey should take about 10 minutes to complete. The goal of this survey is to understand how patients who are using eye drops to treat eye conditions perceive the educational and physical barriers to effective use, and you will be asked to answer questions about that topic. If you have any questions about the research, please contact Dr. Luebke at Judith.luebke@mnsu.edu.

Participation is voluntary. You have the option not to respond to any of the questions. You may stop taking the survey at any time by closing your web browser. Participation or nonparticipation will not impact your relationship with Minnesota State University, Mankato. If you have questions about the treatment of human participants and Minnesota State University, Mankato, contact the IRB Administrator, Dr. Barry Ries, at 507-389-2321 or barry.ries@mnsu.edu.

Responses will be anonymous. However, whenever one works with online technology there is always the risk of compromising privacy, confidentiality, and/or anonymity. If you would like more information about the specific privacy and anonymity risks posed by online surveys, please contact the Minnesota State University, Mankato Information and Technology Services Help Desk (507-389-6654) and ask to speak to the Information Security Manager.

There is the risk that you could find a few of the questions about your eye conditions to be sensitive. The risks of participating are no more than are experienced in daily life.

There are no direct benefits for participating. Future studies on ocular pharmaceutical could make use of this research.

Submitting the completed survey will indicate your informed consent to participate and indicate your assurance that you are at least 18 years of age.

Please print a copy of this page for your future reference.

MSU IRBNet ID# 720717
Date of MSU IRB approval: February 24, 2015

Appendix E: Survey instrument

Educational and Physical Barriers to Eye Drop Use

This survey asks questions about perceptions of educational and physical barriers to learn about using eye drops to treat eye conditions effectively.

General Questions

1. What is your age in years? ____

2. What is your gender? M, F, Prefer not to answer

3. What is your eye condition(s)? _____

If you are not treating an eye condition(s), please indicate 'none' and do not answer the following questions.

4. Do you use eye drops to treat your eye condition? _____

If you are not using eye drops please indicate 'no' and do not answer the following questions.

Treatment

1. How frequently do you see your or eye care provider?

- Never
- 1time each year
- 2 times each year
- 3 times each year
- 4 times or more each year

2. Who provides you with instructions on how to use your eye drops?

- Optometrist or Ophthalmologist
- General or Primary Physician
- Physicians' assistant
- Nurse
- Pharmacist
- Other: Please, describe _____
- No one

3. How many eye drop medications do you use to treat you eye condition?

- One
- Two
- Three or more

4. How long have you been using eye drops to treat your eye condition?

- Less than 1 week
- 1 to 2 weeks
- 3 or more weeks

5. How many eye drops do not make it into your eye(s) per dose?

- No drops per dose
- 1 to 2 drops per dose
- 3 to 4 drops per dose
- More than 5 drops per dose

Education/Instructions

Survey Instructions: Please indicate your level of agreement with the following statements.

1. Instructions on the eye drop box are clear and easy to understand

Strongly Agree	Somewhat Agree	Indifferent	Somewhat Disagree	Strongly Disagree
1	2	3	4	5

2. Words used to explain instructions for your eye drops are clear to understand

Strongly Agree	Somewhat Agree	Indifferent	Somewhat Disagree	Strongly Disagree
1	2	3	4	5

3. The use of pictures to illustrate would improve your understanding of the eye drop instructions.

Strongly Agree	Somewhat Agree	Indifferent	Somewhat Disagree	Strongly Disagree
1	2	3	4	5

4. The use of a video demonstration would improve your understanding of the eye drop instructions.

Strongly Agree	Somewhat Agree	Indifferent	Somewhat Disagree	Strongly Disagree
1	2	3	4	5

Physical/Mechanics

Survey Instructions: Please indicate your level of agreement with the following statements.

1. Instructions in larger font would improve your ability to see and read the instructions clearly.

Strongly Agree	Somewhat Agree	Indifferent	Somewhat Disagree	Strongly Disagree
1	2	3	4	5

2. Having your health care professional demonstrate how to properly use your eye drops would improve your ability to use eye drops on your own.

Strongly Agree	Somewhat Agree	Indifferent	Somewhat Disagree	Strongly Disagree
1	2	3	4	5

3. An eye drop dispenser tool would improve your ability to properly use your eye drops.

Strongly Agree	Somewhat Agree	Indifferent	Somewhat Disagree	Strongly Disagree
1	2	3	4	5

Open Response Questions

1. What do you believe are educational barriers to effective use (examples of educational barriers include, but are not limited to complex instructions or the use of confusing terminology)? In your opinion, how could the instructions for your eye drops be improved?

2. Do you have any physical limitation that makes using eye drops difficult? Does this limitation require additional tools or devices to assist in using eye drops?

3. Does the location of where you instill eye drops (your environment- an example is your bathroom at home) impact your ability to use them?

Appendix F: Edina Senior Center Permission

RE: Survey Permission

DELETE REPLY REPLY ALL FORWARD

Mark as unread

Donna Tilsner <DTilsner@EdinaMN.gov>
Thu 2/5/2015 10:27 AM
Inbox

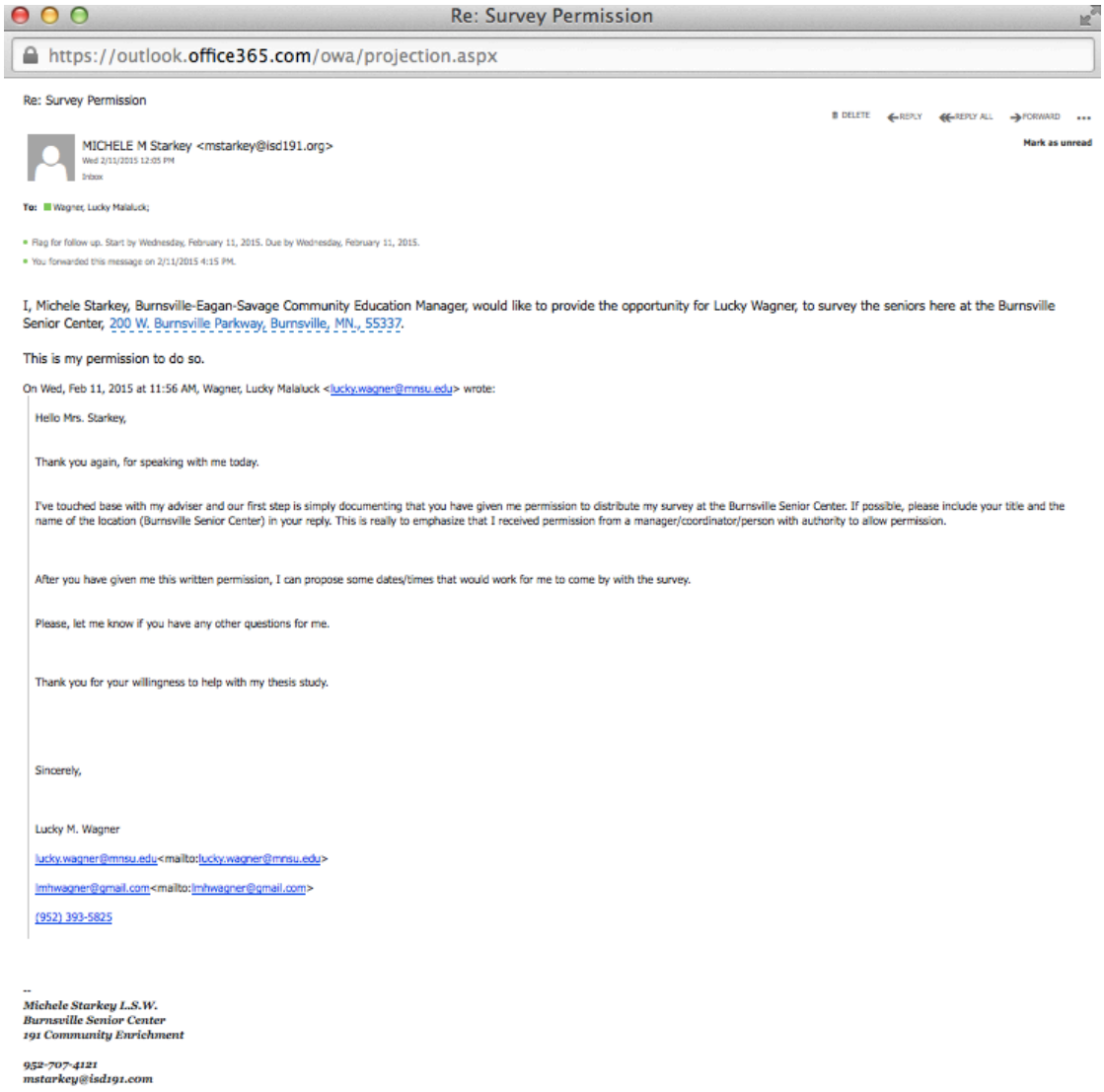
To: Wagner, Lucky Malaluck;
Cc: lmhwagner@gmail.com;

Good morning.
Yes, I have talked with Lucky and we are happy to work with her and have the surveys her at our Edina Senior Center.
I am the recreation supervisor/director at our senior center.
Our address is 5280 Grandview Square, Edina MN. 55436.

Thanks so much. Donna

Donna Tilsner, Recreation Supervisor - Senior Center
952-833-9571 | Fax 952-833-9575
DTilsner@EdinaMN.gov | www.EdinaMN.gov/SeniorCenter
Where the good times begin!

Appendix G: Burnsville Senior Center Permission



Re: Survey Permission

https://outlook.office365.com/owa/projection.aspx

Re: Survey Permission

DELETE REPLY REPLY ALL FORWARD ...

Mark as unread

MICHELE M Starkey <mstarkey@isd191.org>
Wed 2/11/2015 12:05 PM
Inbox

To: Wagner, Lucky Malaluck;

- Flag for follow up. Start by Wednesday, February 11, 2015. Due by Wednesday, February 11, 2015.
- You forwarded this message on 2/11/2015 4:15 PM.

I, Michele Starkey, Burnsville-Eagan-Savage Community Education Manager, would like to provide the opportunity for Lucky Wagner, to survey the seniors here at the Burnsville Senior Center, 200 W. Burnsville Parkway, Burnsville, MN., 55337.

This is my permission to do so.

On Wed, Feb 11, 2015 at 11:56 AM, Wagner, Lucky Malaluck <lucky.wagner@mnsu.edu> wrote:

> Hello Mrs. Starkey,
>
> Thank you again, for speaking with me today.
>
> I've touched base with my adviser and our first step is simply documenting that you have given me permission to distribute my survey at the Burnsville Senior Center. If possible, please include your title and the name of the location (Burnsville Senior Center) in your reply. This is really to emphasize that I received permission from a manager/coordinator/person with authority to allow permission.
>
> After you have given me this written permission, I can propose some dates/times that would work for me to come by with the survey.
>
> Please, let me know if you have any other questions for me.
>
> Thank you for your willingness to help with my thesis study.
>
> Sincerely,
>
> Lucky M. Wagner
>
> lucky.wagner@mnsu.edu<mailto:lucky.wagner@mnsu.edu>
>
> lmhwagner@gmail.com<mailto:lmhwagner@gmail.com>
>
> (952) 393-5825

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191 Community Enrichment

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