

EXAMINING PATIENT-PHYSICIAN COMMUNICATION REGARDING COST IN THE  
GLAUCOMA PATIENT POPULATION

Catherine Slota

A dissertation submitted to the faculty at the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Division of Pharmaceutical Outcomes and Policy in the UNC Eshelman School of Pharmacy.

Chapel Hill  
2015

Approved by:

Betsy Sleath

Susan Blalock

Delesha Carpenter

Alan Robin

Kelly Muir

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## **ABSTRACT**

Catherine Slota: Examining patient-physician communication regarding cost in the glaucoma patient population  
(Under the direction of Betsy Sleath)

Glaucoma is the second leading cause of blindness in the world and has a significant economic impact on patients. Adherence to glaucoma treatment is a significant challenge in this disease population and results in the progression of the disease to more advanced and costly stages. Patient-physician communication has been associated with improved medication adherence in other chronic disease states. Previous studies have cited cost as a significant barrier to adherence in glaucoma patients, yet to date no published articles have examined the specific details of cost-related discussions between glaucoma patients and physicians.

This dissertation is a secondary data analysis of patient interview data and videotape transcripts from glaucoma office visits. Data were collected from 6 ophthalmic sites across the United States from 2009-2012 and include 15 ophthalmologists and 279 glaucoma patients. Qualitative methods were employed to describe the medication cost discussions between glaucoma patients and their ophthalmologists. Logistic regressions were used to investigate the association between physician and patient characteristics and whether medication cost discussions occur. Logistic regressions were also used to examine the influence of patient-physician discussion of medication cost on medication adherence while controlling for a number of patient, physician, and medication characteristics.

Results revealed that 31% of glaucoma office visits contained medication cost discussions. Patients that were new to glaucoma medications and reported it was hard to pay

for their prescriptions were more likely to discuss medication cost. Physicians proposed a solution to a cost problem in 18% of visits while patients indicated cost was a problem in only 5% of visits. Patients who were new to glaucoma medications were less adherent to their glaucoma medications. Communication of medication cost did not significantly predict medication adherence.

This study helps address gaps in the literature by improving our understanding of the extent and nature of patient-provider communication regarding medication cost. Our results have implications for the development of conceptual frameworks and interventions to improve patient-provider communication. Future work should further explore the role of patient-physician communication concerning medication costs on glaucoma patient outcomes.

## **ACKNOWLEDGEMENTS**

First and foremost, I would like to express my deepest gratitude to my dissertation committee for their support, knowledge, and commitment to the success of this project. I am extremely grateful to my primary advisor, Dr. Betsy Sleath for her dedication and encouragement throughout the dissertation process. She has played an integral part in shaping me into the confident and motivated researcher that I am today. I would also like to recognize Dr. Sue Blalock for introducing me the area of patient-provider communication and supporting me throughout my time as a PhD student. It was her enthusiasm and passion for excellence that initially sparked my interest in patient-provider communication. I would like to thank Dr. Delesha Carpenter for her advice, support, and commitment to my success. I would also like to recognize the two ophthalmologists on my dissertation committee, Dr. Alan Robin and Dr. Kelly Muir for their kindness, patience, and expertise in the area of glaucoma. I would not have been able to complete this dissertation without them.

I am grateful to have been a part of the Division of Pharmaceutical Outcomes and Policy at the University of North Carolina. I would like to thank the professors, fellow graduate students, and administrative assistants for making the last four years so memorable.

I would also like to thank my family and friends who always believed in me and stood by my side over the past four years. I would like to thank my Dad, Dr. Peter Slota for inspiring me to become the person I am today. His love and encouragement has given me the strength to tackle any obstacle. I would also like to thank my Mom, Marla Slota for the cards, emails,

phone calls, and prayers that kept me smiling over the past four years. I would also like to thank my sister, Dr. Christina Slota for sharing her experiences and making me laugh over the past four years. I would also like to thank my best friend Kelly Amos for visiting me countless times and always having my back. I am forever grateful to my fiancé, Abhijat Gupta for his remarkable love, patience, and support during the dissertation process.

Finally, I would like to thank the patients, physicians, research assistants, and funding agencies who made this study possible. Their contributions help us understand the role of patient-physician communication concerning medication cost in glaucoma.

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## **LIST OF ABBREVIATIONS**

ARMD	Age-related macular degeneration
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
DAWN	Diabetes Attitudes, Wishes, and Needs
EMR	Electronic medical record
FDA	Food and Drug Administration
GCPO	Glaucoma Communication and Patient Outcomes
GEE	Generalized estimating equation
H-P-A	Hopapp, Parish and Anderson
ICC	Intra-class correlation coefficient
IOP	Intraocular pressure
MEMS	Medication event monitoring systems
OR	Odds ratio
POAG	Primary open-angle glaucoma
PPP	Preferred Practice Pattern
RA	Research assistant
REALM	Rapid Estimate of Adult Literacy in Medicine
SD	Standard deviation

## CHAPTER I: INTRODUCTION

### Overview

Open-angle glaucoma is a chronic eye disease that can lead to irreversible damage of the optic nerve and result in vision loss if left untreated.<sup>1</sup> An estimated 2.8 million Americans were diagnosed with open-angle glaucoma in 2010.<sup>1</sup> Due to a rapidly aging population, the number of open-glaucoma patients is expected to grow to over 3.4 million Americans by 2020.<sup>1</sup> Glaucoma accounts for over 10 million physician visits each year<sup>2</sup> and an estimated \$2.86 billion in direct costs and productivity losses per year in the United States.<sup>3</sup> In 2006, the average direct cost per patient for glaucoma treatment ranged from \$623 per year for early-stage glaucoma patients to \$2,511 per year for end-stage glaucoma patients.<sup>4</sup>

There are currently three treatments for open-angle glaucoma: medication, laser surgery, and traditional surgery.<sup>5</sup> Prescription eye drops are the most common treatment for glaucoma and require life-long use. Drugs used to treat glaucoma include the following: 1) prostaglandin analogs, 2) beta blockers, 3) alpha agonists, 4) carbonic anhydrase inhibitors, 5) cholinergics, and 6) fixed-combination medications.<sup>5</sup> These medications, when they lower intraocular pressure (IOP) are proven to be effective in slowing disease progression; however their effectiveness heavily relies on patient adherence in the earlier stages of glaucoma.<sup>5</sup> Previous research has found approximately 50% of people who begin taking glaucoma medications discontinue them within 6 months.<sup>6</sup>

A number of factors have been associated with non-adherence in glaucoma patients, including the cost of medications.<sup>7-9</sup> Patient-physician communication has been shown to be effective in improving adherence to glaucoma medications.<sup>10</sup> No previous studies have



examined the relationship between communication concerning glaucoma medication cost and adherence. Expanding conversations to include cost of medications and its potential burden on the patient may help physicians understand the cost aspect of glaucoma treatment and work with patients to identify strategies to overcome cost barriers, potentially resulting in improved adherence.

### **Specific Aims**

Individually, glaucoma medication cost and patient-physician communication have been found to be important factors affecting treatment adherence and persistence.<sup>7,8,11-13</sup> However, knowledge gaps exist in understanding the relationship between patient-physician communication regarding glaucoma medication costs and patient adherence to glaucoma medication. A review of the published literature revealed that the nature and extent of patient-physician communication regarding medication cost has not been studied in glaucoma.<sup>8,9,14</sup> The following is unknown: 1) how often patients and physicians discuss glaucoma medication cost and cost problems; 1a) who initiates the discussion of glaucoma medication cost; 2) what physician and patient characteristics are associated with the discussion of medication cost; 2a) the content of glaucoma medication cost discussions; and 3) to what extent patient-physician discussion about glaucoma medication cost affects patient adherence to glaucoma medications.

To accomplish the following aims, an analysis of secondary data was conducted from a previous study of glaucoma communication and patient outcomes. Secondary data included transcripts of videotaped office visits of 279 glaucoma patients and 15 ophthalmologists at 6 ophthalmology clinics throughout the United States. The glaucoma communication and patient outcomes study was a longitudinal study with three time points: baseline, 1-month, and 8-month. Baseline patient interviews, baseline medical record abstractions, and adherence information from Medication Event Monitoring Systems (MEMS) were used to address the following specific aims:

1. Investigate the association between physician and patient characteristics and medication cost discussion during glaucoma office visits.

The relationship between various sociodemographic characteristics of physicians and patients, and discussion of glaucoma medication cost were examined using regression models.

H1: Non-African American patients will be more likely to discuss medication cost compared to African American patients.

H2: Patients with a lower income will be more likely to discuss medication cost compared to patients with a higher income.

2. Describe the prevalence and nature of patient-physician communication regarding medication cost during glaucoma office visits.

The prevalence of medication cost discussions was calculated using transcripts from the baseline visits. The nature of patient-physician communication concerning medication cost included: who initiates the cost discussion, what the provider discusses relating to medication cost, what the patient discusses relating to medication cost, dialogue on insurance coverage, and discussion of medication samples.

H1: The majority of patients and providers will not discuss glaucoma medication costs at their baseline visits.

3. Assess the relationship between discussion of medication cost and patient adherence to glaucoma medications over a 60-day period.

Logistic regression was used to examine the relationship between the discussion of glaucoma medication cost at the baseline visit and the patient's glaucoma medication adherence 60 days after the baseline office visit, controlling for patient, physician and medication characteristics.

H1: Patients who have visits in which medication cost is discussed during their visit will be more adherent to the treatment regimen compared to patients in which cost is not discussed.

To our knowledge, this study is the first that focuses on the nature of patient-physician communication concerning medication cost during glaucoma office visits. The study's findings contribute to the patient-physician communication literature and highlight the importance of cost discussions. The study findings potentially may identify important patient-physician discussions during glaucoma visits and potentially improve medication adherence and overall health outcomes of glaucoma patients.

## **Significance**

Glaucoma is an incurable chronic disease that affects over 2.2 million Americans.<sup>5</sup> Although many forms of glaucoma exist, the pathophysiology common to all forms is that the disease can irreversibly damage the optic nerve and lead to blindness.<sup>15</sup> Elevated intraocular pressure (IOP) is a risk factor for glaucoma and lowering the IOP is the only intervention that has been proven to reduce the risk of vision loss from glaucoma.<sup>15</sup> To lower the IOP, a number of treatments are available to patients, including medication, laser surgery or traditional surgery.

In most cases, prescription eye drop medications are the preferred initial treatment method and are prescribed for life-long use.<sup>15</sup> Eye drops are typically selected as a first line treatment because of their effectiveness and limited side effects.<sup>16</sup> Medications developed for glaucoma are intended to prevent the progression of the disease by lowering IOP and preventing damage to the optic nerve.<sup>17,18</sup> The drugs currently available to treat glaucoma include: 1) prostaglandin analogs, 2) beta blockers, 3) alpha agonists, 4) carbonic anhydrase inhibitors, 5) cholinergics, and 6) and fixed combinations of medications.<sup>5</sup> Although these medications are effective, they rely on patient adherence to the treatment regimen at early

stages of the disease. Unfortunately, research has found that approximately 50% of people who begin taking glaucoma medications discontinued them within 6 months.<sup>6</sup>

A number of barriers are related to medication non-adherence in glaucoma patients.<sup>7-9</sup> One of these barriers, cost of the medications, has been frequently cited in the literature as negatively influencing adherence.<sup>7,8,11,12,19</sup> Patel et al. found that unaffordability was a significant factor influencing the adherence to using eye drops for the treatment of glaucoma.<sup>12</sup> In a study by Sleath et al., about 40% of the study sample reported problems paying for medications as a reason for having difficulty in taking their glaucoma medications. This study also found that patients without prescription drug insurance and those who had more out-of-pocket costs per month for their glaucoma medications were more likely to report difficulty paying for medications.<sup>8</sup>

Patient-physician communication about glaucoma has been shown to affect both medication adherence and persistence.<sup>10,20</sup> Hahn suggests that patient-physician communication can help patients overcome adherence barriers by addressing two motivational domains: 1) the patient's perceived need for medication, and 2) the patient's concerns about taking the medication.<sup>21</sup> By effectively communicating with the patient, physicians can shift the motivational domain to favor adherence by enhancing the patient's perception of need and decreasing the patient's concern about glaucoma medications.<sup>21</sup> Published research has identified strategies to help physicians detect adherence problems and to address adherence barriers, including the following: 1) a 4-step adherence assessment interview, 2) asking open-ended questions in ask-tell-ask sequences, and 3) tailoring interventions to the patient's stage of readiness for change.<sup>21</sup> Hahn later demonstrated an improvement in physicians' communication strategies, and an improved ability to detect and address non-adherence after implementing an educational program.<sup>22</sup>

Research has found that patient-physician communication and patients' health-related beliefs contribute to medication adherence.<sup>23</sup> Some of the variables associated with lower

adherence included: a) not believing that reduced vision results from medication non-adherence, b) a problem paying for medications, and c) difficulty while traveling or being away from home. The investigators suggest the importance of physicians communicating the future effects of glaucoma and the risks of not taking medications to alleviate these adherence barriers.<sup>23</sup>

Patient-physician communication regarding glaucoma medication cost may help patients understand the cost aspect of glaucoma treatment and identify strategies (i.e. use of generic alternatives) to moderate costs, which may ultimately improve patient adherence and health outcomes. Although no studies have examined cost-related communication in glaucoma, patient-physician discussions concerning medication cost have been shown to affect patient medication adherence in other medical conditions.<sup>24,25</sup> In a study of Medicare Part D beneficiaries, investigators found that the discussion of medication cost was significantly associated with switching to a lower priced drug for patients with cost-related non-adherence.<sup>25</sup> This study also found that of the patients who skipped doses or stopped a medication due to cost-related issues, 39% had not talked with a physician beforehand.<sup>25</sup>

Patient-physician communication regarding medication cost may help patients adhere to their glaucoma medications, which in turn may prevent negative health outcomes associated with non-adherence, such as visual disabilities and blindness. Assessing the prevalence of medication cost discussions in our study sample was crucial to understanding the scope of cost discussions in clinical practice. Identifying physician and patient characteristics that were independently associated with discussions of medication cost has the potential to reveal gaps in the quality of care (i.e. racial disparities in glaucoma medication cost discussion), and lay the basis for targeted and tailored interventions to improve care and patient adherence.

## **CHAPTER II: LITERATURE REVIEW**

### **Glaucoma**

#### **Overview**

Glaucoma refers to a group of eye diseases that lead to progressive damage of the optic nerve, all of which are treated by lowering the IOP.<sup>26</sup> If not treated adequately this ultimately leads to both visual disability and blindness. Glaucoma is the leading cause of blindness among African-Americans and Latinos, and the second leading cause of blindness among Whites.<sup>26</sup> Glaucoma causes permanent damage to the optic nerve, a part of the eye that carries the images we see to the brain. If left untreated, the risk of developing blindness from glaucoma is high which would severely impact an individual's quality of life.<sup>5</sup> There are several types of primary glaucoma with the two most common types being open-angle and angle-closure. In open-angle glaucoma the internal drain of the eye appears normal but changes occur in the optic nerve head, often in the setting of elevated eye pressure.<sup>15</sup> This type of glaucoma typically develops slowly, almost always without any symptoms and is a lifelong condition. Pupillary block or angle-closure glaucoma is due to anatomic narrowing of the angle, the part of the eye that drains the aqueous humor. This type of glaucoma often develops very quickly and has symptoms that are usually noticeable.<sup>15</sup> Although less common than open angle glaucoma in the United States, angle-closure glaucoma is more commonly associated with blindness. Variations of glaucoma include congenital glaucoma, traumatic glaucoma, neovascular glaucoma, and irido corneal endothelial syndrome.<sup>5</sup> The proposed dissertation will focus on primary open-angle glaucoma.

## **Primary Open-Angle Glaucoma: The Disease**

### **Overview**

Primary open-angle glaucoma (POAG) is a progressive, chronic disease in which IOP and other unknown factors contribute to damage in the optic nerve and loss of retinal ganglion cells and their axons.<sup>5,27</sup> There are typically no symptoms or early warning signs of the disease until there is advanced damage. Even at later stages of the disease, the symptoms are often vague and non-specific. This is compounded by the fact that we see images with two eyes, so in routine circumstances, small slowly progressive changes in one eye are not detected. Only careful examination of the optic nerve during a dilated eye examination will detect the disease. Glaucoma has been documented in patients as young as 18 years old; however, it is much more common after the age of 40, as the prevalence of glaucoma increases with age.<sup>28,29</sup> Primary open-angle glaucoma will be the focus of the proposed dissertation for a number of reasons: a) it is the most common form of glaucoma in the Western World; b) it usually requires the use of medical treatments to slow disease progression; c) treatments for glaucoma depend on patient adherence and persistence which are significant problems in this population, and d) the dataset used for this dissertation focuses on this patient population. For simplicity the remainder of the dissertation will use the term 'glaucoma' to refer to primary open-angle glaucoma.

### **Prevalence**

Glaucoma is a serious public health problem, affecting an estimated 45 million people worldwide.<sup>1</sup> The prevalence of glaucoma for adults 40 years and older in the United States in 2010 was estimated to be approximately 2.8 million people.<sup>30</sup> It is predicted that the prevalence of glaucoma will rise to about 3.4 million Americans by 2020, due to both an increasing and a rapidly aging population.<sup>30</sup> There are significant differences in the prevalence of glaucoma

among different ethnic groups. African Americans are disproportionately affected by glaucoma, at a three-fold higher prevalence compared to non-Hispanic Whites.<sup>30,31</sup> Research has also found that African Americans are 6 to 8 times more likely to have blindness from glaucoma than Whites.<sup>32</sup> A number of studies have demonstrated that the prevalence of glaucoma increases with age, especially among Latinos/Hispanics and African Americans.<sup>33-36</sup> Friedman et al. demonstrated that the risk of getting glaucoma increases to 9.4% in Whites and 23.2% in African Americans by the age of 75.<sup>29</sup> Research investigating the barriers to treatment for glaucoma among African American Medicare beneficiaries found limitations in access to the eye care system. Once the effect of unequal access to the eye care system was resolved, the poor treatment for glaucoma among African American beneficiaries was reduced, but not completely eliminated, suggesting the existence of other unknown factors.<sup>37</sup>

### **Diagnosis and Severity Staging**

Glaucoma is typically not associated with symptoms or early warning signs, and must be diagnosed by an optometrist or ophthalmologist. The Glaucoma Research Foundation recommends that five factors be checked before making a glaucoma diagnosis, including: 1) tonometry to examine IOP; 2) ophthalmoscopy to examine the shape, color, and depth of the optic nerve; 3) perimetry or the visual field test to examine the functional damage as the damage usually begins in the visual periphery and then spreads to the central area of vision; 4) gonioscopy to examine the angle in the eye where the iris meets the cornea ensuring that it is not a form of angle-closure or secondary glaucoma, and 5) pachymetry to examine the thickness of the cornea.<sup>41</sup> Once diagnosed, regular glaucoma check-up appointments include tonometry and ophthalmoscopy testing.<sup>15 38-41</sup>

Glaucoma severity is evaluated using a visual field test and can be assessed in a variety of ways.<sup>42,43</sup> One of the most common methods to assess severity are from Hodapp, Parish and



Anderson (H-P-A).<sup>42</sup> The H-P-A classification system considers the overall extent of damage and the proximity of the defect to fixation. The classification of defects is broken down into three categories: 1) early defect, 2) moderate defect, and 3) severe defect.<sup>42</sup> Mills et al. introduced a new system in 2006 to assess glaucoma severity.<sup>43</sup> Mill's staging system has six categories, which are evaluated based on Humphrey visual field: stage 0 (ocular hypertension/earliest glaucoma), stage 1 (early glaucoma), stage 2 (moderate glaucoma), stage 3 (advanced glaucoma), stage 4 (severe glaucoma), and stage 5 (end stage).

## **Treatment Options**

### **Overview**

The treatments available to glaucoma patients are medication, laser surgery and traditional surgery.<sup>5</sup> None actually “treat glaucoma”. All are used to lower IOP which prevents the development or progression of the disease. Currently, there are no commercially available neuroprotective or regenerative medications. The American Academy of Ophthalmology's 2010 Preferred Practice Patterns suggest that all new patients should be given the option of medical, laser, or surgical therapy.<sup>39,44,45</sup> The purpose of these treatments is to lower the IOP to prevent further damage. Currently there are no treatments to repair damaged optic nerves, only to prevent or retard progression of the disease. The most common treatment option in the United States for newly diagnosed glaucoma patients is medication. Medications are typically the first line treatment method because of their effectiveness and minimal side effects. Glaucoma medications work in one of two ways: 1) by reducing the amount of fluid made in the eyes or 2) by increasing the outflow of aqueous humor.<sup>46</sup> It is important to note that over 50% of patients require more than one glaucoma medication.<sup>47</sup> The medications used to treat glaucoma will be described in more detail in the following section.

Laser surgery works by improving the ability of the eye to drain fluid. Laser surgery is done in an outpatient setting; often the entire surgery can be performed in minutes. A slit lamp commonly used in each eye doctor's visit and a special contact lens are used to guide the laser. Some people who have laser surgery may still need medication to control their glaucoma. In addition, the effects of the surgery may wear off after several years, requiring additional surgery or use of another treatment.<sup>46</sup>

Traditional surgery works by redirecting fluid to bypass the insufficient drainage system.<sup>46</sup> The wall of the eye can be changed so that a safety valve is fashioned out of the eye's wall, allowing fluid to escape into a reservoir. Alternatively, new drainage pathways can be made by placing small drainage devices, such as tubes, in the patient's eyes. This type of surgery is similar to laser surgery in that some patients may still require medication to control their glaucoma, and the effects of traditional surgery may also wear off and require additional surgery.<sup>46</sup> Traditional glaucoma surgery is also associated with a relatively high rate of post-operative complications compared to common eye surgeries such as cataract surgery.<sup>48</sup>

## **Medications for Glaucoma**

Currently, 5 classes of medications are available to prevent the progression of glaucoma: 1) prostaglandin analogs, 2) beta-adrenergic antagonists, 3) carbonic anhydrase inhibitors, 4) alpha-adrenergic agonists, 5) cholinergic agents, and 6) fixed combinations of medicines.<sup>46</sup> The carbonic anhydrase inhibitors are available as eye drops or pills but far more commonly used topically. A summary of each type of medication, brand name, administration route, dosing schedule, generic availability and drug name is presented in Table 1. The general side effects for glaucoma eye drop medications include redness in and around the eyes, blurred vision, burning sensation, itching, increased tears, sensitivity to light, dry eye, and eye discomfort.<sup>46</sup> In addition, prostaglandin analogs can cause a darkened color of the iris and

eyelid, as well as lengthening and thickening of the eyelashes. The pills acetazolamide and methazolamide can cause loss of appetite, nausea and vomiting, diarrhea, drowsiness, bad taste in the mouth, tingling of the extremities, severe anemia, ringing in the ears, kidney stones, and skin rash.<sup>46</sup> The Food and Drug Administration (FDA) has warned that oral medications for glaucoma may have severe side effects or cause allergic reactions since they are sulfa derivatives. As a result, these drugs are rarely prescribed except for short periods of time in acute situations.

**Table 1: Medications Used for the Treatment of Glaucoma Adapted from Treatment for Glaucoma: Comparative Effectiveness<sup>46</sup>**

Type of Medicine	Brand Name	How Taken	Taken How Often	Generic Available?	Drug Name
Prostaglandin Analogs	Lumigan <sup>®</sup>	Eye drops	Once a day	Only at 0.03%	Bimatoprost
	Travatan Z <sup>®</sup>			Only at 0.03%	Travoprost
	Xalatan <sup>®</sup>			Yes	Latanoprost
	Zioptan <sup>®</sup>			No	Tafluprost*
Beta-Adrenergic Antagonists	Betagan <sup>®</sup>	Eye drops	Twice a day	Yes	Levobunolol
	Betoptic S <sup>®</sup>			Yes	Betaxolol
	Ocupress <sup>®</sup>			Yes	Carteolol
	Timoptic <sup>®</sup>			Yes	Timolol
Carbonic Anhydrase Inhibitors	Azopt <sup>®</sup>	Eye drops	Three times a day	No	Brinzolamide
	Trusopt <sup>®</sup>			Yes	Dorzolamide
	Diamox <sup>®</sup>	Pills	Twice a day	Yes	Acetazolamide
	Neptazane <sup>®*</sup>			Yes	Methazolamide*
Alpha-Adrenergic Agonists	Alphagan <sup>®</sup> P	Eye drops	Three times a day	Yes	Brimonidine
Cholinergic agents (Miotics)	Isopto <sup>®</sup> Carpine*	Eye drops	Up to four times a day	Yes	Pilocarpine*
Combination of medicines	Combigan <sup>®</sup>	Eye drops	Twice a day	No	Brimonidine and timolol
	Cosopt <sup>®</sup>			Yes	Dorzolamide and timolol
	Simbrinza <sup>®</sup>		Three times a day	No	Brinzolamide and Brimonidine

## **Practice Guidelines for Glaucoma**

### **Overview**

The American Academy of Ophthalmology developed the Preferred Practice Pattern (PPP): a set of guidelines and recommendations to assist practitioners treating glaucoma patients.<sup>39</sup> Recommendations were developed based on the best evidence available. These guidelines discuss various topics ranging from population screening to management of the disease.<sup>39</sup>

### **Guidelines in Reference to Patient-Physician Communication**

The term patient-physician communication is not specifically used in PPP guidelines. However, the guidelines encourage ophthalmologists to work collaboratively with patients.<sup>39</sup> In the counseling/referral section of the PPP guidelines, the importance of educating patients is described. The guidelines recommend educating the patient about the disease process, the rationale and goals of treatment, as well as the status of their condition and the relative benefits and risks of alternative treatments. The guidelines also support active participation by the patient in the development of a suitable plan of action for the treatment and management of glaucoma.<sup>39</sup>

### **Guidelines in Reference to Medication**

The PPP guidelines mention the availability of various drugs for initial glaucoma therapy and recognize medication decisions are influenced by a number of factors, including cost, side effects, and dosing schedule.<sup>39</sup> The guidelines address the importance of the patient and ophthalmologist working together to decide on a regimen and recognize that the dosing regimen and medication cost may impact adherence.<sup>39</sup>

A number of indications are mentioned for adjusting glaucoma therapy: a) the target IOP is not achieved; b) the patient is intolerant of the medication; c) contraindications to the medication develop, or d) the patient does not adhere due to cost or other issues.

The PPP guidelines stress the importance of providing care that is cost effective without compromising accepted standards of quality.<sup>39</sup> Therefore, it is important to examine patient-physician communication regarding glaucoma medication costs.

## **Cost of Glaucoma and Glaucoma Medications**

### **Overview**

Glaucoma is a relatively expensive chronic condition to manage.<sup>49</sup> Medical visits with ophthalmologists, possible surgery, and medication prescribed for life-long use can create a substantial economic burden on the glaucoma patient population. The literature is divided in terms of the greatest contributor to glaucoma management expense;<sup>4,49,50</sup> some studies have identified the majority of costs to be attributed to pharmacy related expenses, while others suggest non-pharmacy costs such as physician visits.<sup>4,49,50</sup> These studies all agree that the severity of glaucoma is a significant predictor of cost since the greater the severity, the higher medication costs and more frequent the glaucoma office visits and potential for blindness. Therefore, slowing the progression of the disease is recognized as a priority in order to reduce the economic impact of glaucoma. The cost of medications remains a frequently cited barrier to medication adherence; however, significant gaps in the literature exist regarding the extent of discussions regarding cost during glaucoma office visits and the strategies to overcome cost barriers.<sup>8,9,12,51</sup>

## **Cost of Glaucoma Treatment and Medications**

In a recent study by Stein et al., the average annual cost for glaucoma-related services per patient was estimated to be \$1,484 at 1 year after diagnosis and \$2,516 at 2 years after diagnosis.<sup>52</sup> The costliest group of patients represented 5% of the study population, accounting for 24.1% of all glaucoma-related charges. Predictive characteristics of the costliest individuals included age, region of residence, and presence of comorbid eye conditions. Interestingly, the odds of being in the costliest group decreased 9% for every 5 years of age. The investigators postulate that glaucoma-related charges increase with younger age due to two factors: 1) clinicians are more likely to be aggressive at managing the glaucoma of younger patients, and/or 2) patients detected at an earlier age are more likely to have more severe or aggressive disease. Compared to individuals living in the Northeast United States, individuals in the Southeast had a 22% decreased odds of being in the top 5%, while people in the West had a 19% decreased odds, and those in the Midwest had 35% decreased odds of being in the top percent. Individuals with glaucoma and concomitant diabetic retinopathy or age-related macular degeneration had 97% and 38% increased odds of being in the top 5%, respectively.<sup>52</sup>

A study by Lam et al. revealed that mean annual glaucoma medication expenditure per subject increased from \$445 in 2001 to \$557 in 2006.<sup>53</sup> Women, individuals with public-only insurance, and individuals with less than a high school education, experienced the greatest increase in costs. The type of medication was also predictive of expense with beta-blockers having less of an impact on costs and alpha agonists and prostaglandin analogs having a higher impact on expenditures.<sup>53</sup> The dosing regimens and availability of generic substitutes undoubtedly had a significant effect on these findings. More recent studies on the cost of glaucoma medications are unavailable, however we predict that expenditures for prostaglandins have most likely decreased in recent years with the first prostaglandin, Latanoprost, going generic in 2011.<sup>54</sup>

The relationship between glaucoma disease severity and costs of disease management has been established in the literature.<sup>4,55</sup> Fiscella et al. explains that the direct costs of the disease often increase as glaucoma progresses from earlier to advanced stages.<sup>55</sup> The cost increases are due to direct ophthalmology-related resource use such as physician visits, medications, visual field exams, and glaucoma surgeries.<sup>4,55</sup> The authors conclude that increasing adherence and slowing advancement to more severe stages will contribute to a reduction in the economic burden of glaucoma. Research by Bramley suggests that if glaucoma progresses to vision loss, there are significant increases in the economic impact of the disease, such as increased nursing home admissions, depression, falls and injury.<sup>56</sup>

### **Cost Related to Non-adherence**

The cost of glaucoma medications has been cited as a significant barrier to adherence.<sup>8,12,51</sup> In a review paper by Schmier et al., the investigators found that increased costs were associated with increased severity or lack of control over IOP, allowing glaucoma to progress to more severe stages.<sup>9</sup> In a study by Patel and Spaeth, interviews with 100 glaucoma patients identified unaffordability to be a significant predictor of non-adherence to glaucoma eye drops.<sup>12</sup> Another study surveyed 324 glaucoma patients taking at least 2 glaucoma medications to examine problems associated with medication adherence.<sup>8</sup> Difficulty paying for medications was the second most commonly cited problem identified as contributing to glaucoma medication non-adherence. The researchers also found that patients who paid more out-of-pocket per month and who did not have prescription drug insurance reported greater difficulty paying for their medications.<sup>8</sup> Dreer et al. conducted focus groups with 89 African Americans to examine glaucoma medication adherence and reported cost/affordability to be one of the top five barriers to appropriate medication use.<sup>57</sup> In another study by Friedman et al., investigators found that patients who identified a problem paying for their glaucoma medication were more likely to have

a lower medication possession ratio, defined as the ratio of the days of supply of medication dispensed divided by the days between pharmacy fulfillments.<sup>23</sup>

Income has also been identified as a predictor of non-adherence in the glaucoma patient population. In a study of 116 glaucoma patients, income was positively associated with adherence when adherence was defined as: a) the proportion of days taking any drops within 3 hours of the prescribed dosing time and b) the proportion of days taking any drops within 6 hours of the prescribed dosing time.<sup>51</sup>

Lack of health insurance prescription coverage has also been identified as a barrier to glaucoma medication adherence.<sup>7,20</sup> In a study by Tsai et al., 48 glaucoma patients were interviewed regarding their treatment regimen and adherence.<sup>7</sup> All 48 patients had medical insurance; however, one third reported that their insurance did not pay for their glaucoma medications. One patient stated, 'when my insurance stopped paying for my medication I didn't take my eye drops.' However, the literature reports varied effects of insurance coverage on adherence based on the patient sample studied and the definition of adherence.<sup>7</sup> More work is needed to examine if patients communicate with their physicians about health insurance and problems with medication coverage.

### **Cost and Insurance Related to Eye Care Utilization**

Cost and insurance coverage has also been related to problems with follow-up care in glaucoma.<sup>58</sup> Follow-up care is essential for adjusting medication regimens, providing prescription refills, and monitoring disease progression.

In a study by Li et al., 3,158 individuals with glaucoma, age-related macular degeneration (ARMD), and/or cataracts were studied to compare the rates of eye care visits and vision impairment among working-age adults with or without vision insurance.<sup>58</sup> Approximately 40% of the study sample had no vision insurance. The investigators found that individuals with vision insurance were more likely than those without insurance to have had eye care visits.<sup>58</sup>



Another study investigated eye-care utilization among women aged 40 years or older during 2006-2008. Investigators reported that 8-21% of women did not receive the recommended follow-up eye care for their diagnosis of diabetic retinopathy, glaucoma or ARMD due to cost or lack of insurance.<sup>59</sup>

The cost of medical encounters has also been found to influence patient behavior. In a study by Kosoko et al., patients identified cost of examinations as one of the most common reasons to not keep follow-up appointments.<sup>60</sup> Friedman et al. analyzed a cohort of glaucoma suspects and diagnosed glaucoma patients using a national insurance database linking pharmacy and patient care data.<sup>61</sup> The investigators found that over 15% of those diagnosed as having glaucoma or as glaucoma suspects who filled at least one prescription for topical ocular hypotensive agents did not have a documented follow-up visit during the study period (median 440 days). Practice guidelines recommend that diagnosed glaucoma patients should be seen at least once a year and glaucoma suspects with low levels of risk factors should be seen at least every 18 months. Follow-up visits are important for updating medication regimens, providing prescription refills, and monitoring disease progression. The investigators suggest future prospective research focus on the reasons behind the loss during follow-up appointments.<sup>61</sup>

## **Patient-Physician Communication**

### **Overview**

The literature base is expanding in the area of patient-physician communication and its relationship to medication adherence in the glaucoma patient population;<sup>2,21,23</sup> yet, the literature is sparse when investigating patient-physician communication about medication cost and its relationship to medication adherence.<sup>62</sup> Although there is a paucity of cost-related communication studies in glaucoma, other disease states, such as rheumatoid arthritis and diabetes, have investigated this relationship thoroughly.<sup>63</sup> Understanding the current state of

patient-physician communication regarding glaucoma medication costs and its relationship to adherence will be crucial to developing effective and meaningful interventions.<sup>14</sup>

### **Patient-Physician Communication and Adherence in Other Disease States**

As previously mentioned, the relationship between patient-physician communication and adherence has been investigated in other chronic disease states.<sup>64,65</sup> In the context of diabetes, the interaction between patients and healthcare providers has been shown to positively impact medication adherence.<sup>66</sup> The multinational Diabetes Attitudes, Wishes, and Needs (DAWN) study demonstrated that the quality of patient-provider collaboration and having a diabetes nurse at the premises was positively correlated with adherence to medications and lifestyle regimens.<sup>64</sup> Patient-provider collaboration was evaluated with the following questions: 1) I have a good relationship with the people I see about my diabetes, 2) my doctor spends enough time with me, 3) I feel that I am fully involved in the treatment decisions, and 4) how easy do you find it to talk to your main doctor. The investigators suggested that the communication between patients and healthcare providers helped to resolve patient distress and informed patients of treatment options, which ultimately improved adherence and glycemic control.<sup>64</sup> Another study in diabetes patients found that patient ratings of better provider communication effectiveness were positively correlated with improved self-management skills.<sup>67</sup>

The relationship between patient-physician communication and adherence has also been evaluated in chronic obstructive pulmonary disease (COPD). Lareau et al. investigated adherence with inhaler therapy in patients with COPD.<sup>65</sup> The investigators suggest that a lack of medication adherence needs to be addressed by increasing patient knowledge about self-management and enhancing provider skills in patient education, communication and adherence counseling.<sup>65</sup> Farin et al. reviewed communication and adherence studies in chronic disease populations and concluded that successful communication leads to greater adherence.<sup>68</sup> The

investigators stressed the need for further development on patient-physician communication research with respect to a solid theoretical basis, integration of qualitative and quantitative methods, and conducting longitudinal studies.<sup>68</sup>

### **Patient-Physician Communication and Adherence in Glaucoma**

The importance of patient-physician communication for medication adherence in the glaucoma patient population has been demonstrated in several studies.<sup>21,69,70</sup> Buller et al. investigated 100 glaucoma patients taking topical medication to lower IOP.<sup>69</sup> Poor communication between ophthalmologists and patients, or general practitioners, caused nearly one in five patients to use the wrong regimen. The study also found a common cause of non-adherence involved newly diagnosed patients mistakenly thinking that the initially prescribed bottle was the full course of treatment.<sup>69</sup> In-depth surveys of 80 individuals diagnosed with open-angle glaucoma, glaucoma suspect or ocular hypertension, revealed that patient beliefs, behavior, and knowledge relating to patient-physician communication were predictive of medication adherence.<sup>70</sup> Compared with adherent participants, non-adherent participants were less likely to: believe their eye doctor spent sufficient time with them, ask their doctor questions, or understand the benefits of taking their medications. Non-adherent participants were also more likely to have difficulty remembering to take their medications.<sup>70</sup> In a study by Hahn et al., the investigators suggest that in addition to cost and logistical issues with obtaining a medication, a patient's adherence to medications is influenced by an imbalance between their perceived need for medication and their concerns about taking it. The investigators suggest that patient-centered communication techniques can engage the patient and allow them to address adherence barriers.<sup>21</sup>

As demonstrated by the studies described above, patient-physician communication plays an important role in improving medication adherence. Therefore, patient-physician

communication regarding medication cost may have the potential to improve medication adherence. To our knowledge, no one has previously examined patient-physician communication about glaucoma medication costs.

### **Patient-Physician Communication Concerning Medication Cost in Other Disease States**

In addition to adherence, other chronic disease states have been examined in terms of patient-physician communication concerning medication cost. For example, Beard et al. investigated patient-physician communication concerning medication cost during rheumatoid arthritis patient visits.<sup>63</sup> That study collected data from 200 rheumatoid arthritis patients from 4 rheumatology clinics in the United States. Using similar methodology to the proposed study, they utilized audiotape transcripts of medical visits, questionnaires, and medical records. They found that only 34% of visits included a discussion of medication costs, with 48% being initiated by the patient. Communication about medication costs were more common when patients were White, had an annual income of \$20,000-\$59,000 and when physicians were White.<sup>63</sup>

Communication concerning medication cost among adherent and non-adherent individuals was examined in a different study. In that study, Wilson et al. investigated the prevalence of patient-physician communication concerning medication cost and adherence among elderly adults in the United States.<sup>25</sup> They found that among patients reporting cost-related non-adherence, 39% had not talked to a physician about it. They also found that having a discussion about drug cost was significantly associated with switching to a lower priced drug.<sup>25</sup> Schmittiel et al. investigated how Medicare Part D diabetes beneficiaries communicated with physicians about drug costs, the importance of these communications, level of prescription drug switching due to cost, and self-reported cost-related medication non-adherence.<sup>24</sup> The investigators found that the majority of study participants wanted to discuss cost with their physician and for their physician to consider cost when choosing medications. They also found that patients with lower household incomes were more likely to have talked

about prescription drug costs with doctors and reported cost-related non-adherence compared to higher income patients.<sup>24</sup> The study also found that White patients were more likely to discuss cost of medications with their physician compared to non-White patients. Overall, these studies point to the need for more in-depth research on communication between physicians and patients regarding medication costs.

### **Patient-Physician Communication Concerning Medication Cost in Glaucoma**

To the author's knowledge, there have not been any studies investigating patient-physician communication concerning medication cost in glaucoma patients. Higher medication costs have been associated with lower adherence to glaucoma medications.<sup>8,12,51</sup> However, the literature is limited on medication cost discussions and its relationship to medication adherence in glaucoma.

The cost of glaucoma medications can vary considerably based on the number of medications prescribed, availability of generic substitutions, and the actual costs of generics. For example, the wholesale price of Xalatan, a branded drug, is \$120 per month. The generic substitute, Latanoprost is available at a wholesale price of \$90 per month.<sup>46</sup> Certain pharmacies offer \$4 prescriptions for some generic glaucoma medications.<sup>71</sup> Because there are large differences in price between brands and pharmacies, discussions between the prescribers and patients are vital when choosing a glaucoma medication for life-long use.

### **Medication Adherence and Persistence**

#### **Overview**

Medication adherence and persistence are commonly cited problems for patients with chronic diseases. Medication adherence refers to the degree or extent of conformity to the prescribing instructions about day-to-day treatment by the provider with respect to timing,

dosage, and frequency.<sup>72</sup> Medication persistence refers to the act of continuing the treatment for the prescribed duration.<sup>72</sup> Adhering to glaucoma medications is especially challenging because glaucoma is an asymptomatic chronic disease. In a study by Nordstrom et al., investigators found that about one half of individuals who filled a glaucoma prescription discontinued therapy within six months.<sup>6</sup> The study also found that by 3 years, 63% of the study sample had discontinued their medication. Similar findings have been observed in other studies analyzing pharmacy claims data.<sup>73</sup>

A variety of methods have been used to study medication adherence in glaucoma patients including pharmacy claims, electronic monitoring devices, patient records, surveys, self-report and in-depth patient interviews.<sup>8,51,69,70,73-79</sup> A number of studies have identified factors related to non-adherence such as race and the severity of disease.<sup>7,80,81</sup> Interventions aimed at reducing the barriers to adherence have been developed with limited success.<sup>14,22</sup> Overall, medication adherence and persistence remains a significant problem for glaucoma patients.<sup>14</sup> More research is required to identify and reduce barriers to adherence. By advancing the knowledge base regarding medication non-adherence in the glaucoma patient population, we can guide future interventions aimed at reducing IOP and minimizing disease progression.

## **Measurement of Medication Adherence**

Various approaches have been implemented to study medication adherence in the glaucoma patient population. Typically the selection of how to measure adherence is based on the question being studied and the availability of data and resources. The definition of adherence and persistence also varies depending on the specific study.<sup>73,75</sup> Providing a clear definition enables investigators to interpret study findings in an appropriate manner.

There are four main types of measures used to evaluate adherence in the glaucoma patient population: a) claims data, b) electronic medical record data, c) self-report data, and d) electronic monitoring devices.<sup>82,83</sup> Each measure has advantages and disadvantages associated with its use. The following section will describe in greater detail the various measures of adherence.

### ***Claims Data***

Claims data consist of the billing codes that physicians, pharmacies, hospitals and other health care providers submit to various payers.<sup>82</sup> The data typically follow a consistent format and uses a standard set of pre-established codes that represent specific diseases, procedures and drugs. Because health care providers want to be reimbursed for their services, almost all non-postoperative encounters a patient has with the medical system leads to the generation of a claim. Claims data have several advantages, as they include important details about medications such as fill and refill of prescriptions with associated dates. The name of the drug, amount dispensed and the number of days the medication should last are also provided. There are also some disadvantages associated with claims data: information is often missing or inaccurate because the primary purpose for claims data is reimbursement and not for use in research; also, it is impossible to verify that patients actually took their medication. Claims data allows for the collection of a large sample of data, however interpretation and analysis of these data is often complex.<sup>82</sup> Schwartz et al. performed a study utilizing claims data from 2001 and 2002 to investigate persistence and restart rates in glaucoma patients using three prostaglandin analogs.<sup>73</sup> The use of claims data allowed for a large sample size of 4356 patients initiating prostaglandin therapy. The investigators found that among patients who discontinued their index prostaglandin, over half failed to restart any topical therapy. Therefore, the authors concluded that persistence of glaucoma medications continues to be a challenge for glaucoma patients.<sup>73</sup>

### ***Electronic Medical Record***

The electronic medical record (EMR) is accessed directly by physicians to record the details of their encounters with patients.<sup>82</sup> The advantage of EMR data is that it contains more detail such as vital signs, lab results, information from the patient (possibly including subjective adherence to medication), and information recorded by nurses and pharmacists. On the downside, there are many different kinds of EMRs, which can make data linkage difficult. Also, EMR data can be hard to obtain due to privacy regulations. With EMR data, you cannot be sure that the patient actually got the glaucoma drops in their eyes. Robin and Covert utilized patient records to examine the effect on adherence of added complexity in a glaucoma treatment regimen.<sup>75</sup> Investigators calculated the mean number of days between refills and the difference in refill intervals between the two points in time to evaluate adherence. The refill intervals significantly increased after the addition of a second glaucoma medication. The investigators recommended that physicians consider the impact of adding a second glaucoma medication on a patient's adherence.<sup>75</sup>

### ***Self-report***

Self-report data are obtained directly from the patient through the use of questionnaires or interviews.<sup>83</sup> Self-report measures are quick, inexpensive and easy to use, and avoid the use of sophisticated equipment. However, self-reports have been shown to overestimate adherence.<sup>83</sup> Self-report is also plagued with recall bias, social desirability bias and errors in self-observation. The wording of questions and the skills of an interviewer can either facilitate or be detrimental to gaining accurate responses.<sup>83</sup> Sleath et al. distributed a survey to 324 glaucoma patients to describe the different types of problems patients have when taking their medications and the relationship between patient-reported problems and medication adherence.<sup>8</sup> Investigators found that patients who had difficulty remembering to take their glaucoma medications and those who reported that they had other problems with their medications were significantly less likely to be 100% adherent. The use of self-report data



allowed investigators to identify which patient-reported problems were associated with non-adherence.

### ***Electronic Monitoring***

Electronic monitoring devices have the ability to record the exact time a bottle is opened, providing a less-biased estimate of adherence as compared to self-report.<sup>74,84</sup> However, these devices are very costly and analysis of data can be difficult. Electronic monitoring devices cannot confirm that the patient actually took the medication, only that the cap was removed. Also, if subjects know they are being monitored, their adherence may change. Robin et al used electronic monitoring devices in a study and found patients with more complex dosing regimens had poorer adherence.<sup>74</sup> The investigators concluded that the incorporation of a time component in electronic devices provides more information than prescription refill rate or other methods.<sup>74</sup>

### **Conclusion of Measures of Adherence**

There are a variety of ways to measure adherence in observational research. Each method has advantages and disadvantages, which are important to weigh when choosing a measure of adherence for a specific study. The parent study, Glaucoma Communication and Patient Outcomes (GCPO) utilized self-report and electronic monitoring to evaluate adherence in the sample. The use of two methods strengthens the study, allowing the comparison of self-report to electronic monitoring.

### **Factors related to Non-adherence**

A variety of factors beyond cost have been predictive of non-adherence in the glaucoma patient population. Other factors influencing adherence include the number of glaucoma medications, the complexity of the dosing regimen, health literacy, race, gender, and age.<sup>51,77,85,86</sup>

### ***Number of Glaucoma Medications***

The relationship between the number of glaucoma medications and medication adherence has been described in the literature.<sup>74,75,85</sup> Robin et al. observed the significance of the number of glaucoma medications on medication adherence. The investigators found that adherence to a second glaucoma medication was poorer as compared to adherence to the first glaucoma medication.<sup>74,75</sup> Djafari et al. had similar findings with patients on fewer medications being significantly more adherent compared to patients on more medications.<sup>85</sup>

### ***Complexity of Dosing Regimen***

An association between the complexity of dosing regimens and medication adherence has also been described in the literature.<sup>12,77</sup> Gurwitz observed that patients using glaucoma medications requiring more than two administrations per day were less adherent than patients using glaucoma medications requiring less than two administrations per day.<sup>77</sup> Patel et al. also investigated the complexity of dosing regimens and found that having a 'once daily' dose frequency significantly improved adherence, with 'more doses per day' being associated with lower adherence.<sup>12</sup>

### ***Health Literacy and Level of Education***

The relationship between health literacy and medication adherence has been reported in the literature.<sup>51,86</sup> Muir et al. investigated the relationship between health literacy and medication adherence in glaucoma patients using patient surveys and concomitant chart review.<sup>86</sup> They found that only 48% of participants read at or above a ninth grade level. They also found a positive relationship between health literacy and the number of prescription refills. The authors concluded that many glaucoma patients have poor health literacy and that these patients are less adherent to medications, which could negatively impact their health outcomes.<sup>86</sup>

Muir et al. evaluated the influence of an individual's health literacy level on an educational intervention to improve glaucoma medication adherence.<sup>86</sup> The intervention was

tailored to the health literacy level of each patient. Patients were divided into three subgroups of health literacy: adequate, marginal, and inadequate. The investigators found that within each subgroup of literacy, subjects in the health education intervention group experienced fewer mean days without glaucoma medicine than subjects in the control group. They concluded that patients with poor health literacy skills may benefit from educational interventions that are tailored to their health literacy level to improve medication adherence.<sup>87</sup> A higher level of education was predictive of better adherence in two definitions of adherence in a study by Dreer et al.: a) proportion of days taking any drops within 3 hours of the prescribed dosing time and b) proportion of days taking any drops within 6 hours of the prescribed dosing time.<sup>51</sup>

### ***Patient Demographic Factors***

The literature is divided in terms of the significance of race, gender and age in predicting glaucoma medication adherence.<sup>12,51,57,77</sup> Dreer et al. found a significant association between race and adherence in a study of 116 patients with ocular hypertension or open-angle glaucoma.<sup>51</sup> Adherence was evaluated using an electronic dose monitor collected 3 months after enrollment. Race strongly predicted adherence in three different definitions developed by Dreer et al. ranging from more stringent to less stringent definitions; a) proportion of days taking the prescribed number of drops within 3 hours of the prescribed dosing time, b) proportion of days taking any drops within 3 hours of the prescribed dosing time and c) proportion of days taking any drops within 6 hours of the prescribed dosing time. Individuals of African descent had statistically worse adherence than individuals of European descent. In definition 1, race alone predicted 11% of the variance in treatment adherence. In definition 2, race alone significantly predicted 15% of the variance in treatment adherence. In definition 3, race combined with income predicted 19% of the variance in treatment adherence. Younger age was significantly associated with worse adherence using definition 1 and 2.<sup>51</sup>

Patel and Spaeth studied factors associated with non-adherence by interviewing 100 glaucoma patients.<sup>12</sup> They found gender and race to be marginally significant factors relating to

adherence, with men and blacks reporting somewhat higher rates of missed doses than women and whites. Age was not significantly associated with adherence in this study.<sup>12</sup>

Gurwitz et al. and Djafari did not find an association between age and medication adherence.<sup>51,77,85</sup> A possible explanation for the discrepancies in the literature regarding the influence of these factors may be the population studied and how adherence was measured and defined.

Many factors have been related to medication non-adherence in glaucoma patients.<sup>12,51,86</sup> However, the literature remains divided on how significant these factors are in explaining the low adherence of glaucoma patients and how to use these findings to develop successful interventions.

### ***Research Gap***

No published literature has reported how patient-physician communication concerning medication costs influences adherence in the glaucoma patient population. Understanding this relationship could provide new pathways to improve medication adherence through the use of targeted interventions to increase the quality of patient-provider communication about medication costs.

## **CHAPTER III: CONCEPTUAL FRAMEWORK**

### **Overview of Conceptual Model**

The following sections describe the theoretical framework used to guide this dissertation by identifying factors that contribute to patient-physician communication concerning medication cost during glaucoma office visits and the influence of cost discussions on patient medication adherence. Eisenberg's Sociologic Influences on Decision-Making and Piette's Chronically Ill Patient's Response to Cost Pressures were used as the foundation for the proposed theoretical framework.<sup>88,89</sup> A brief introduction to the patient-physician relationship will first be described. Next, the theories used to guide the development of this study's theoretical framework will be described, followed by an explanation of the modifications that were made to develop this dissertation's theoretical framework.

### **Patient-Physician Relationship**

Before describing the theoretical frameworks predicting communication and adherence, it is important to understand the importance of the patient-physician relationship. The patient-physician relationship can be represented as four different forms: paternalism, mutuality, default and consumerism.<sup>90</sup> Paternalism is typically recognized as the traditional form of the patient-physician relationship. The patient is passive while the physician takes on a dominant role. Consumerism, which is the opposite of paternalism, portrays the patient as having high control and the physician playing a more passive role. Mutuality occurs when patients and physicians work together in a more balanced relationship. In mutuality, both participants contribute their strengths and resources to the relationship. Default is a result of an ineffective relationship and

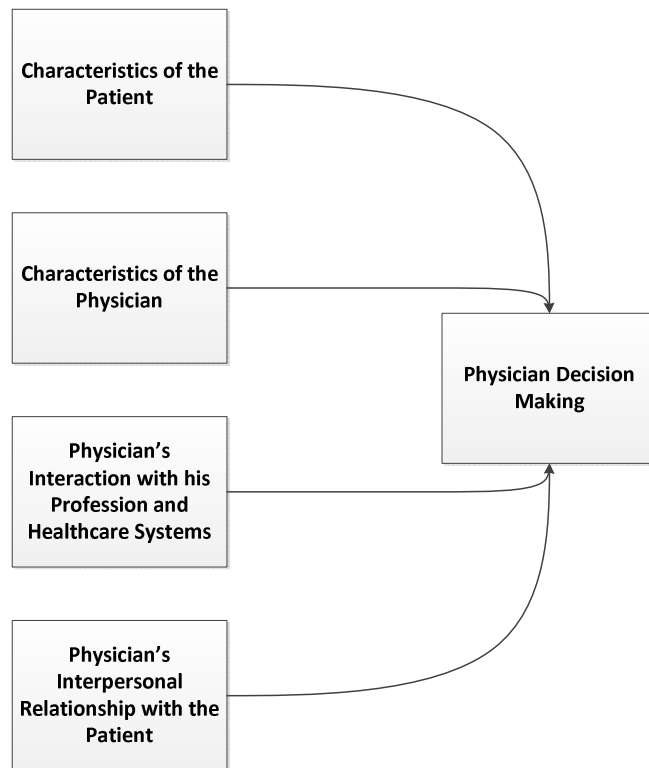
is characterized by a total lack of control for both patient and physician. For example, patients may fail to commit to the therapeutic regimen and physicians may fail to engage, educate or influence the patient.<sup>90</sup>

Understanding these relationships is critical in the development and interpretation of theoretical frameworks describing patient-physician communication. Both Eisenberg and Piette integrate patient-physician communication into their models to describe clinician and patient behavior, respectively. Thus, it is important to recognize the various forms this relationship can take.

### **Eisenberg's Sociologic Influences on Decision-Making**

Eisenberg's Sociologic Influences on Decision-Making was originally developed to describe the influence of the doctor-patient interaction and other sociocultural factors on decision-making by clinicians.<sup>88</sup> The literature had recognized non-biomedical variables such as one's profession and personality as contributing to the 'differential treatment' of patients by physicians.<sup>91</sup> In order to describe the influences of sociocultural factors, Eisenberg grouped sociocultural factors into 4 broad categories important to medical decision-making: 1) characteristics of the patient, 2) characteristics of the physician, 3) physician's interaction with his profession and health care system, and 4) physician's interpersonal relationship with the patient, displayed in Figure 1.<sup>88</sup>

**Figure I: Eisenberg's Sociologic Influences on Decision-Making**



There is significant evidence of the influence of patient characteristics on physician decision-making.<sup>92-97</sup> Previous research describes how patient characteristics such as social class, income, ethnicity and gender can influence physician decisions.<sup>92,98,99</sup> Social class, as estimated by physicians, has been linked to diagnosis and treatment decisions. For example, in the diagnosis of personality disorders, social class bias caused lower-class patients to be diagnosed more frequently as compared to middle-class patients.<sup>92,93</sup> Patient income has also been found to influence decision making with one study showing that psychotherapists resisted treating low-income patients.<sup>98</sup>

The physician's characteristics are also related to medical decision-making.<sup>100-102</sup> Research has found that physician characteristics may influence their approach to medicine.<sup>103</sup> Physicians characterized as interventionists are more likely to be disease-oriented while physicians characterized by a tendency towards health maintenance are more likely to be

patient-oriented. Disease-oriented physicians are inclined toward immediate action while patient-oriented physicians are more willing to observe the situation. Physician age and education have also been related to medical decision-making.<sup>102,104,105</sup> Younger physicians have been shown to prescribe drugs more appropriately, but also tend to order more laboratory tests.<sup>105</sup> Research has found that physicians with a superior education tend to prescribe medications more appropriately.<sup>88,104</sup>

The physician's interaction with his profession and the health care system has been related to medical decision-making.<sup>106,107</sup> Two types of medical practices have been identified: 1) client-dependent and 2) colleague-dependent.<sup>106</sup> Physicians who work in a client-dependent setting tends to respond more to the desires of their patients. Conversely, a physician working in a colleague-dependent setting responds to influences from the professional community and the norms of other physicians more than the expectations of the patient. Coleman et al. investigated colleague-dependent activities by observing the acceptance of a new drug in a medical community by studying filled prescriptions. They found that the most influential interactions regarding this new drug occurred through informal relationships with other physicians and institutional ties. They also found that physicians with more involvement in the medical community were more likely to have early adoption of the new drug.<sup>107</sup>

The next sociocultural influence, the patient-physician relationship, has been found to influence medical decision-making. Research in this area has identified three patterns of interaction between physicians and their patients: 1) activity-passivity in which the physician controls the interaction and the patient is passive, 2) guidance-cooperation in which the physician provides advice that the patient is expected to agree and comply with, and 3) mutual participation in which the physician helps the patient help themselves.<sup>108</sup> The type of decision-making style utilized may depend on the situation. For example, Barber et al. suggests that the type of decision-making style is influenced by the generation the physician grew up in. A traditional physician may tend to use the model of a physician who is superordinate and



authoritative. This type of physician would make all the medical decisions for the patient and expect a subordinate and respectful patient in response. These physicians follow a paternalistic relationship, as described earlier. Modern physicians, by contrast, may use shared decision-making models where patients and physicians work together to make medical decisions. These physicians follow a more mutualistic relationship, as described earlier.<sup>109</sup>

Eisenberg's paper on sociologic influences on decision-making has been cited hundreds of times since its publication.<sup>88</sup> Many of these papers focus on physician prescribing behavior, shared-decision making, health disparities, patient education, and patient-physician communication.<sup>110-113</sup> Sleath and Shih examined the influence of Eisenberg's four factors on antidepressant prescribing.<sup>110</sup> All four factors were found to influence prescribing. The patient's insurance status was related to the likelihood of receiving an antidepressant with privately insured patients being almost twice as likely to receive a prescription as compared to self-paying patients. Patient age was related to prescribing patterns, with patients who were ages 18-34 being significantly less likely to be prescribed non-SSRI antidepressants than SSRI antidepressants. Physician characteristics, such as the physician's specialty, were also related to prescribing. The physician's interaction with the health care system was related to prescribing through geographical differences; the geographical areas identified in the study were Northeast, Midwest, South, and West. The authors postulate that cultural norms, physician training, pharmaceutical training tactics, and physician adoption of guidelines could explain the differences in prescribing. The physician's interaction with the patient was also related to prescribing. The physician-patient interaction included: a) if the physician had seen the patient before, b) whether depression was the first diagnosis listed for the visit, and c) type of depression diagnosed. The severity of depression influenced prescribing, with patients with major depression significantly more likely to be prescribed a non-SSRI.<sup>110</sup>

Overall, Eisenberg argues that decision-making is influenced by 4 types of factors: 1) including patient characteristics, 2) physician characteristics, 3) physician's interaction with their

profession and health care system, and 4) the doctor-patient relationship. These four factors will be critical to understanding the following: 1) which patient and physician characteristics influence the discussion of cost and 2) how patient-physician communication influences medication adherence. To further develop the framework to predict medication adherence 60 days after the baseline office visit, Piette's Chronically Ill Patient's Response to Cost Pressures was used.<sup>89</sup> The next section describes this framework and how it helps serve as the theoretical basis for the current study.

### **Piette's Chronically Ill Patient's Response to Cost Pressures**

Piette's work on chronically ill patients' responses to cost pressures resulted from the complex relationship between out-of-pocket medication costs and adherence.<sup>89</sup> Predicting an individual's response to cost pressures and adherence by level of financial burden is not sufficient; previous research has found that some patients take medications as prescribed despite high out-of-pocket costs and low incomes.<sup>114</sup> Other research has found patients who appear to be able to afford their medications still cite cost as a barrier to adherence. For example, one study found that 13% of diabetes patients with moderate to high incomes reported cost-related underuse despite their perceived ability to afford these medications.<sup>115</sup> These studies support the existence of other factors influencing the medication cost/adherence relationship.

Piette's theoretical model shows a relationship between patient demographics and cost-related non-adherence.<sup>89</sup> Steinman found an association between race and cost-related non-adherence.<sup>114</sup> Non-white Americans were almost three times as likely to report cutting back on medication use due to cost problems as whites, even when controlling for out-of-pocket costs, health and drug coverage, income and health status indicators.<sup>114</sup> Age has also been associated with cost related non-adherence, with studies finding older patients are less likely to

forgo medications when facing cost pressures as compared to younger patients.<sup>114,116</sup> Medication type has been associated with a cost-related underuse of medications. Medications with complex dosing schedules and more adverse drug events tend to have more cost-related underuse.<sup>117</sup>

Piette's theoretical model shows the relationship between a clinician's influence on a patient's medication regimen and the associated cost pressures. Piette recognizes that for chronic diseases, clinicians can often choose from multiple therapies ranging from low-cost generics to high-cost brand drugs.<sup>118</sup> The prescribing decision can be influenced by the treatment efficacy, side effects, and the marketing efforts of pharmaceutical companies.<sup>119</sup> Research has shown that physicians may take the patient's ability to afford medications into account when prescribing but they often have a hard time identifying which patients have cost problems.<sup>120</sup> Research has also shown that patients have a number of barriers preventing them from discussing medication cost including the belief that physicians can't help, embarrassment, or feeling pressed for time during office visits.<sup>62,116</sup>

The health system is another factor that can contribute to cost-related non-adherence. Public health care systems contribute additional barriers to medication use including long waits for refills and difficult application processes for prescription drug assistance programs. In a study by Piette et al., more than one-third of low-income diabetes patients treated in the public health care system reported cost-related medication underuse, even though most were eligible for prescription coverage. Two possible explanations include patient beliefs and lack of knowledge of availability of assistance programs.<sup>121</sup>

Piette's paper on this conceptual framework has been cited 49 times in the literature since its publication in 2006.<sup>89</sup> A majority of these papers utilized the framework to explain the high rates of non-adherence among different chronic disease populations.<sup>122,123</sup> Some of the cited research aimed to design interventions based on factors identified in Piette's framework<sup>124</sup>

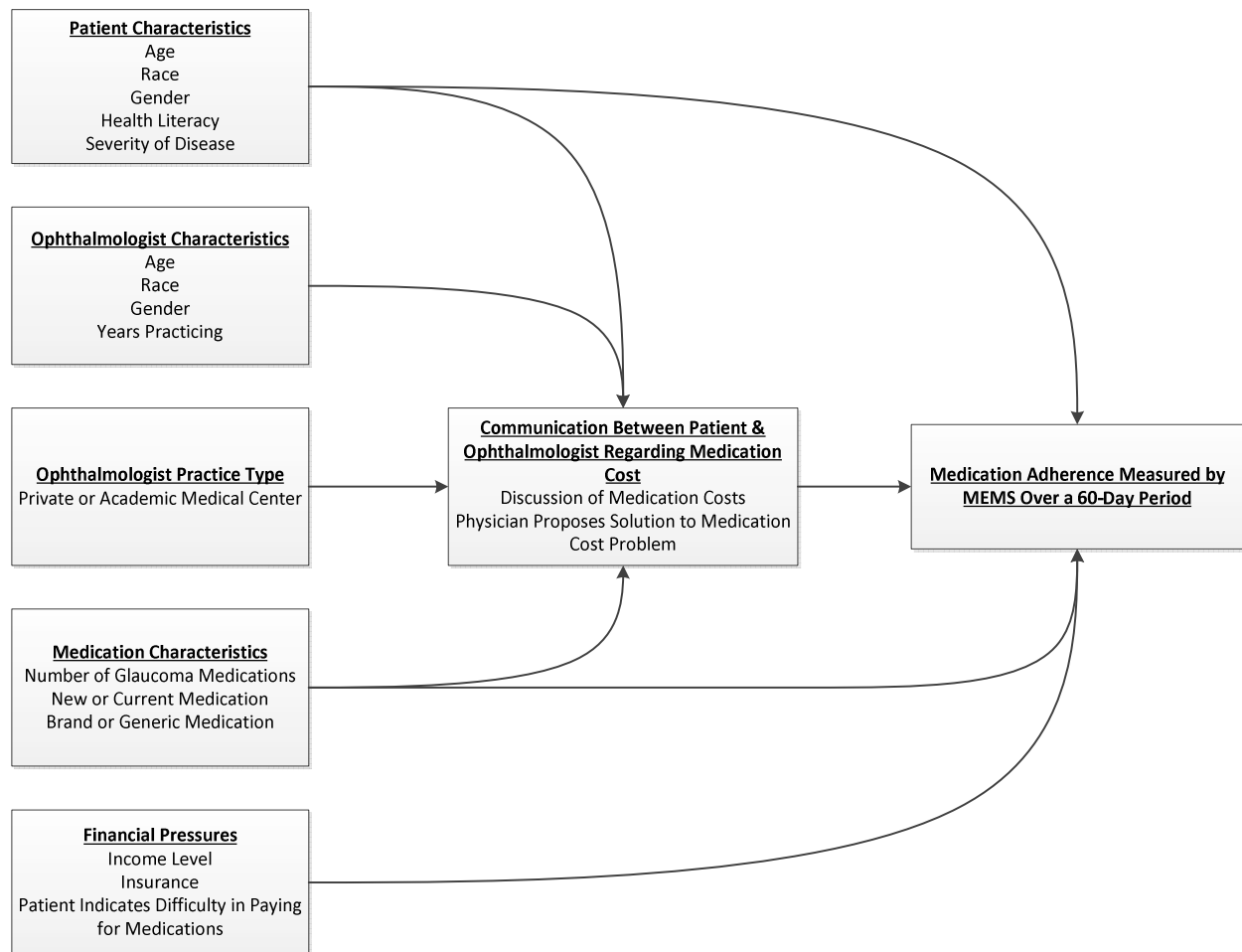
Overall, Piette's conceptual framework provides a basis for understanding the factors relevant to medication cost non-adherence. Adapting this framework in combination with Eisenberg's Sociologic Influences on Decision-Making<sup>88</sup> will provide an innovative and useful framework to help describe the factors relevant to the discussion of medication costs and non-adherence in the glaucoma patient population.

### **Proposed Conceptual Framework**

The proposed conceptual framework for this dissertation was adapted from Eisenberg's Sociologic Influences on Decision-Making and Piette's Chronically Ill Patient's Response to Cost Pressures (Figure II).<sup>88,89</sup> The adaptations presented below are based on the glaucoma literature and availability of data from the parent study, Glaucoma Communication and Patient Outcomes (GCPO).

As shown in Figure II, the five main areas contributing to communication between patients and ophthalmologists regarding medication cost are patient characteristics, ophthalmologist characteristics, ophthalmologist practice type, medication characteristics, and financial pressures. Three of these areas, patient characteristics, medication characteristics, and financial pressures, directly contribute to medication adherence. Finally, communication between patients and ophthalmologists regarding medication cost contributes to medication adherence. These areas and relationships will be discussed in more detail below.

**Figure II Conceptual Model Incorporating Eisenberg's Sociologic Influences on Decision-Making and Piette's Chronically Ill Patient's Response to Cost Pressures**



## Patient Characteristics

The proposed theoretical model presents patient characteristics as working along two distinct pathways: 1) to influence patient-physician communication concerning medication cost and 2) to influence medication adherence. Patient characteristics include age, race, gender, health literacy and severity of disease. As presented earlier, patient characteristics have been found to influence communication between physicians and patients. Research has shown that

ethnic minority patients are less verbally expressive and less assertive during medical encounters, leading to the hypothesis that non-White patients will be less likely to initiate a discussion concerning medication cost, resulting in worse adherence.<sup>125</sup> Patient characteristics have also been related to medication adherence. Older patients have been shown to be less likely to forgo medications when facing cost pressures compared to younger patients, leading us to hypothesize that older patients will be more adherent. Another characteristic, health literacy, will be included because prior research has shown that patients with low literacy are less adherent to their glaucoma medications.<sup>52,77</sup> Disease severity has been related to medication adherence with patients having worse defect severity showing lower levels of adherence.<sup>126,127</sup>

### **Ophthalmologist Characteristics**

Ophthalmologist characteristics are incorporated in the proposed theoretical model as influencing patient-physician communication concerning medication cost. Ophthalmologist characteristics include age, race, gender, and years practicing. As described earlier, physician characteristics are related to patient-physician communication. Gender has been linked to the extent of communication based on the interactants' goals, skills, perceptions, and emotions.<sup>128</sup> Female physicians are significantly more likely to report an empathic communication style, which may allow them to identify with patients and enhance the discussion of medication cost.<sup>128</sup> Patient-physician concordance in terms of social characteristics including race, gender, age and education were found to have cumulative effects on patient-physician communication and perceptions of care.<sup>129</sup> Patients with physicians of the same race describe their physicians' decision making style as more participatory, which we hypothesize will increase patient-physician communication concerning medication cost.<sup>130</sup> Fewer years of practice experience are hypothesized to be associated with more communication regarding medication cost since recent

graduates are less likely to have a directive approach to care, enabling a more interactive discussion.<sup>131</sup>

### **Ophthalmologist Practice Type**

Ophthalmologist practice type is incorporated into the theoretical model as influencing patient-physician communication concerning medication cost. The relation of physicians to their professional environment was suggested by Eisenberg to influence decision-making.<sup>88</sup> In the model, 'ophthalmologist practice type' is described as whether they practice in an academic medical center or private practice. Research has found that discussions of medication cost are more likely to occur with patients seen in a community practice compared to academic medical center.<sup>62</sup> Therefore, we hypothesize that discussions of medication cost will be more prevalent in private practices compared to academic medical centers.

### **Medication Characteristics**

The proposed theoretical model links medication characteristics to both discussion concerning medication costs and medication adherence. Medication characteristics include the number of glaucoma medications and the status of the medication (whether it is a new or current medication). Use of more glaucoma medications is hypothesized to decrease medication adherence because studies have found a significant increase in refill intervals for patients when a second medication was added to a currently used once-daily drug.<sup>75</sup> Patients who have a newly initiated medication are hypothesized to be less adherent due to research finding adherence to be a common problem for many glaucoma patients and especially for patients new to therapy.<sup>132</sup>

### **Financial Pressures**

Financial pressures are included in the proposed theoretical model as influencing medication adherence. Piette suggests that financial influences such as income, prescription

insurance, out of pocket costs and other health costs are important influences on adherence.<sup>89</sup> Research has found that higher out-of-pocket medication costs and lower incomes are each associated with lower rates of medication use.<sup>114,115,133,134</sup> Adapting financial pressures specific to the study, three factors are included: 1) income level, 2) prescription insurance coverage and 3) patient indicates that it is hard to pay for medications during an interview with a research assistant.

### **Communication between Patient and Ophthalmologist Regarding Medication Cost**

Patient-physician communication about medication cost is the key factor that will be examined in this dissertation. Research has described poor communication between physicians and patients as an important barrier to medication adherence in glaucoma patients.<sup>20 10</sup> Research in other disease states show similar findings.<sup>67,68</sup> A study in diabetes patients found that patient ratings of better provider communication effectiveness were significantly related to improved self-management skills.<sup>67</sup> A review of the literature in chronic diseases suggests that successful communication leads to greater adherence.<sup>68</sup>

The literature remains sparse regarding patient-physician communication concerning medication cost in glaucoma and the effects of cost discussions on adherence to medications. However, studies have investigated this relationship in other chronic conditions. A study of Medicare Part D beneficiaries found that discussions concerning medication cost was significantly associated with switching to a lower priced drug for patients with cost-related non-adherence.<sup>25</sup> Other studies have found the majority of diabetic patients want to discuss cost with their physician and for their physician to consider cost when choosing medications.<sup>24</sup> However, research has found that these medication cost discussions are rare. Beard et al. found that medication cost discussions occurred in only 34% of rheumatoid arthritis office visits.



Therefore, we hypothesize that the majority of glaucoma office visits will not contain a discussion of medication cost.

Another key factor that will be examined is whether physicians propose a solution to a medication cost problem during the glaucoma office visit. There is no published literature on the effects of physicians proposing solutions to medication cost problems on medication adherence. However, proposing solutions to cost problems may help reduce medication cost barriers leading to improved adherence.

### **Medication Adherence**

Adherence to glaucoma medications is crucial to slow the progression of glaucoma and prevent further vision loss.<sup>126</sup> We hypothesize that patients who have visits in which medication cost is discussed will be more adherent to their glaucoma medications during the 60-day period following the discussion compared to patients who do not discuss medication cost during their visit, controlling for the other factors in the conceptual model. If a relationship between medication cost discussions and adherence is found, there will be a subsequent need to create targeted interventions to improve and facilitate patient-physician discussion concerning medication costs.

### **Summary of Theoretical Framework**

The theoretical framework developed for this dissertation was guided by two theories, Eisenberg's Sociologic Influences on Decision-Making and Piette's Chronically Ill Patient's Response to Cost Pressures.<sup>88,89</sup> This framework describes factors that contribute to patient-physician communication about medication cost during glaucoma office visits and their influence on patient medication adherence. The framework was adapted to reflect the relevant concepts from each theory, the glaucoma literature, and the availability of data from the parent study.

## **CHAPTER IV: METHODS**

### **Data Source**

#### *Parent study*

This study involved a secondary analysis of data from a recently completed observational study funded by the National Eye Institute. The parent study evaluated how communication between glaucoma patients and their ophthalmologists was associated with health outcomes. The parent study began enrollment in May 2009 and ended enrollment in November 2012; it included 15 ophthalmologists and 279 of their glaucoma patients. Patients and providers were recruited from 6 ophthalmology sites in the United States. Study data include videotapes of office visits and eye drop technique, patient interviews, medical record abstractions, and adherence data obtained via Medication Event Monitoring Systems (MEMS).

#### *Eligibility Criteria*

Patients were eligible for the parent study if they met the following criteria: a) age 18 or older; b) able to speak and understand English; c) were scheduled for a new glaucoma, glaucoma suspect, or glaucoma visit; d) mentally competent to participate; and e) not blind in both eyes (no perception of light).

#### *Data Collection Procedures*

Provider consent was obtained from the 15 ophthalmologists who participated in the study. All providers completed a demographic survey after providing consent. Regarding patient recruitment and enrollment, a research assistant (RA) explained the purpose of the study and obtained written consent from interested and eligible patients. Before the ophthalmologist entered the exam room, the RA set up a video camera, started recording and

exited the room. When the physician was finished with the visit, the RA re-entered the room and stopped the recorder. If the individual was diagnosed with glaucoma and prescribed a glaucoma medication, the RA conducted an interview with patients, videotaped their eye drop technique, and extracted the patient's IOP from the medical record. The demographic information was collected during the interview with the patient. Patients were then given a large prescription vial with a MEMS cap in which to keep their eye drop prescription. One vial/MEMS cap was typically given for each separate glaucoma medication (up to 4 prescriptions). However, the number of MEMS caps given per patient was unique depending on the clinic. This was due to a temporary shortage of MEMS caps at some of the clinics during enrollment. Therefore, some patients may not have received caps for all of their glaucoma medications. The RA showed the patient how to use the MEMS cap and also gave the patient written instructions. The RA was responsible for calling the patient the next day to confirm that the eye drop containers were correctly placed in the prescription vials with the MEMS caps. The RA confirmed the follow-up appointment with the patient to collect adherence data. At the 4-6 week and 8-month follow-up appointments, the RA retrieved the MEMS device and scanned the data into a computer, which provided information on adherence for the 60 days following the baseline visit. The patients and physicians were unaware of the study hypotheses.

### *Transcript Generation*

All videotapes were transcribed verbatim under the supervision of the principal investigator of the primary grant (not an eye care provider or associated with any of the centers involved). All identifiers were removed when the office videotapes were transcribed.

### *Transcript Coding*

The transcripts were coded using a coding instrument developed specifically for this study. For the remainder of the dissertation, this coding instrument will be referred to as the 'supplemental coding instrument' because the parent study had its own coding instrument. An

initial draft of the supplemental coding instrument was developed by the author of the study and was refined and tested during the initial part of the study. The author of the study performed the majority of the coding with the supplemental instrument and was not blinded to the study hypotheses. A secondary coder was used to assess inter-coder reliability. Both coders were blinded to patient demographics. The second coder was blinded to the study hypotheses.

### Measurement of Demographic Variables

This section describes the measurement of a) patient and physician demographics and b) medication and financial characteristics. The data came from two sources: 1) patient interview data collected at baseline and 2) medical record abstractions. Table 2 outlines the demographic variables and measures that were included in the analyses, including source, type and range.

**Table 2: Patient, Medication, Financial, and Physician Variables, Source and Range**

Variable	Source	Range
<b>Patient Characteristics</b>		
Gender	Patient Interview at Baseline	1=male; 0=female
Age (in years)	Patient Interview at Baseline	Continuous
Race/ethnicity	Patient Interview at Baseline	1=White; 2=Asian; 3=African American; 4=Native American; 5=Hispanic; 6=Other
REALM health literacy	Patient Interview at Baseline	1=eighth grade and below; 0= ninth grade and above
Severity of Disease (defect)	Visual field data abstracted from Medical Record at Baseline	0=early; 1=moderate to severe
<b>Comorbidities (patient self-reported)</b>		
Diabetes	Patient Interview at Baseline	1=yes; 0=no
High Blood Pressure	Patient Interview at Baseline	1=yes; 0=no
High Cholesterol	Patient Interview at Baseline	1=yes; 0=no

Arthritis	Patient Interview at Baseline	1=yes; 0=no
Hypothyroidism	Patient Interview at Baseline	1=yes; 0=no
Heart Disease	Patient Interview at Baseline	1=yes; 0=no
Depression	Patient Interview at Baseline	1=yes; 0=no
<b>Physician Characteristics</b>		
Gender	Physician Questionnaire at Baseline	1=male; 0=female
Race	Physician Questionnaire at Baseline	1=non-white; 0=white
Age (in years)	Physician Questionnaire at Baseline	Continuous
Years Practicing Medicine	Physician Questionnaire at Baseline	Continuous
<b>Ophthalmologist Practice Type</b>		
Practice Type	Physician Questionnaire at Baseline	1=academic medical center; 0=private practice
<b>Medication Characteristics</b>		
Total Number of Glaucoma Medications	Medical Record Abstraction at Baseline	Discrete
New Glaucoma Medication User	Medical Record Abstraction at Baseline	1=yes; 0=no
<b>Financial Pressures</b>		
Patient Annual Income	Patient Interview at Baseline	1=less than \$20,000; 2 = \$20,000-\$39,999; 3= \$40,000-59,000; 4= \$60,000-\$79,999; 5= \$80,000 or more; 6= don't want to answer/don't know
Does Patient Have Insurance	Patient Interview at Baseline	1=yes; 0=no
Type of Insurance	Patient Interview at Baseline	1=Medicaid; 2=Medicare; 3=Private; 4=Other
Does Patient Have Prescription Insurance	Patient Interview at Baseline	1=yes; 0=no
Patient Indicates it is Hard to Pay for Glaucoma Medications	Patient Interview at Baseline	1=yes; 0=no

## **Patient Characteristics**

The patient interview at baseline provided information about patient characteristics. Gender was recorded as a dichotomous variable, male or female. Age in years was measured as a continuous variable. The race of a patient was measured as a categorical variable: a) White, b) African American, c) Asian, d) Native American and e) Hispanic.

Another measure included in the study is the Rapid Estimate of Adult Literacy in Medicine (REALM). The REALM is a validated, rapid screening instrument that is designed to identify patients who have difficulty reading common medical and lay terms used in patient education materials.<sup>135</sup> In the analysis, the REALM was dichotomized to eighth grade and below (REALM score of 0-60) or ninth grade and above reading level (REALM score of 61-66) since patients reading below ninth grade have trouble reading most patient education materials.<sup>135</sup>

Another group of variables included in the study was existence of chronic comorbid conditions. During the patient interview at baseline, patients reported if they had any of the following conditions: a) diabetes, b) high blood pressure, c) high cholesterol, d) arthritis, e) hypothyroidism, f) heart disease, or g) depression. These variables were dichotomized as yes/no.

Glaucoma severity was measured using the glaucoma staging system presented by Mills et al (2006).<sup>43</sup> The four stages are: stage 1 (early glaucoma), stage 2 (moderate glaucoma), stage 3 (advanced glaucoma), and stage 4 (severe glaucoma). In the analysis, severity was evaluated both as a categorical variable and dichotomized variable. The dichotomized variable was separated as early versus moderate to severe glaucoma.

### **Physician Characteristics**

Information concerning physician characteristics was obtained through the use of a physician questionnaire at baseline. Physician gender was recorded as female or male. The age (in years) of a physician at the beginning of the study was recorded as a continuous variable. Physician race was recorded as non-white or white. The length of time, in years, a physician has been practicing medicine was recorded as a continuous variable.

### **Ophthalmologist Practice Type**

The ophthalmologist practice type was coded as a dichotomous variable, private or academic medical center.

### **Medication Characteristics**

Information concerning medication characteristics was extracted from the patient medical record. The total number of glaucoma medications was recorded as a discrete variable. Combination medications were counted as one medication. Whether the patient was a new glaucoma medication user, was classified as a dichotomous variable, yes or no.

### **Financial Pressures**

Information concerning financial pressures came from the baseline patient interview. The income level of the patient was recorded as a categorical variable with the following categories: a) less than \$20,000, b) \$20,000-39,999, c) \$40,000-59,000, d) \$60,000-79,999, e) \$80,000 or more, f) don't know/don't want to answer. A patient's health insurance was recorded two ways: 1) a dichotomous variable, yes or no and 2) a categorical variable, Medicaid,

Medicare, Private or Other. A patient's availability of prescription insurance was recorded as a dichotomous variable, yes or no. The last financial pressure variable was patients indicate it is hard to pay for their glaucoma medications. This variable was dichotomized as yes or no.

## Measurement of Communication Variables

### *Supplemental Coding Instrument*

The supplemental coding instrument and coding rules are available in Appendix A. The source, range, and reliability of each of the variables are presented in Table 3 and described below. The supplemental coding instrument broke communication down into seven sections: 1) cost discussion and discussion initiator (patient or physician), 2) overall medication and other cost discussions, 3) provider behavior regarding cost discussions, 4) patient behavior regarding cost discussions, 5) insurance and drug cost, 6) samples, and 7) medication discussion.

**Table 3: Communication Variables, Source, Range, and Reliability**

Variable	Source	Range	Reliability ICC <sup>a</sup>
<b>Cost Discussion and Initiator</b>			
Cost Discussion Occurred	Coding Tool	1=yes; 0=no	0.94
Initiator of Cost Discussion	Coding Tool	1=Physician; 2=Patient	1.0
<b>Overall Medication and Other Cost Discussion</b>			
Medication Cost Discussed	Coding Tool	1=yes; 0=no	0.94
Patient Indicates Cost is a Problem	Coding Tool	1=yes; 0=no	0.88
<b>Provider Behavior</b>			
Physician Asks about a Medication Cost Problem	Coding Tool	1=yes; 0=no	1.0
Physician Proposes a Solution to Potential Cost Problem	Coding Tool	1=yes; 0=no	0.77
Physician Recommends Patient Work with Pharmacist to Lower Medication Cost	Coding Tool	1=yes; 0=no	1.0
Physician Asks How Much Patient is Paying for Medications	Coding Tool	1=yes; 0=no	100% agreement*



Physician Recommends Patient Try 3-Month Supply to Reduce Cost	Coding Tool	1=yes; 0=no	1.0
<b>Patient Behavior</b>			
Patient Changes Medication Regime due to Cost Problem	Coding Tool	1=yes; 0=no	0.79
Patient Discusses Coping Strategies Used in the Past to Deal with Cost Problems	Coding Tool	1=yes; 0=no	1.0
<b>Insurance and Drug Cost</b>			
Health and/or Prescription Drug Insurance Discussed	Coding Tool	1=yes; 0=no	0.93
Coinsurance and/or Copayment is Discussed	Coding Tool	1=yes; 0=no	0.88
Medication Assistance Programs Discussed	Coding Tool	1=yes; 0=no	1.0
Four Dollar Generics Discussed	Coding Tool	1=yes; 0=no	1.0
Laser is Discussed as a Solution to a Medication Cost Problem	Coding Tool	1=yes; 0=no	100% agreement*
<b>Samples</b>			
Patient Requests Samples	Coding Tool	1=yes; 0=no	100% agreement*
Physician Provides Samples	Coding Tool	1=yes; 0=no	0.91
Physician Discusses Being Unable to Provide Samples	Coding Tool	1=yes; 0=no	100% agreement*
<b>Medication Discussion</b>			
Term Brand or Generic is Used	Coding Tool	1=yes; 0=no	1.0
Physician Initiates Discussion of Brand or Generic	Coding Tool	1=yes; 0=no	0.90
Physician Explains Difference Between Brand and Generic	Coding Tool	1=yes; 0=no	0.79
Patient Expresses Confusion Concerning Brand versus Generic	Coding Tool	1=yes; 0=no	1.0
Physician Says Generic isn't Available	Coding Tool	1=yes; 0=no	0.79
Physician Offers to Write Prescription for Generic	Coding Tool	1=yes; 0=no	0.85
Physician Asks if Patient has a Preference for Generic or Brand	Coding Tool	1=yes; 0=no	1.0
Patient Expresses Preference for Generic	Coding Tool	1=yes; 0=no	1.0
Patient Expresses Preference for Brand	Coding Tool	1=yes; 0=no	1.0

\* There was 100% agreement that the variable did not occur in the transcripts that were double-coded

### **Cost Discussion and Initiator**

The first variable was number of cost discussions that occur zero, one, two, or three. A cost discussion was defined as a discussion of one topic relating to medication cost. Therefore, this discussion may continue throughout the transcript. For example, physicians may summarize discussions of medication cost at the end of the visit. In these cases, we would conclude that there was one cost discussion. The initiator of each cost discussion was recorded by selecting one of the following options: a) physician or b) patient. This variable was a categorical variable.

### **Overall Medication and Other Cost Discussions**

The coding tool broadly identified what was discussed during the office visit by evaluating the following communication variables: a) glaucoma medication cost discussed during the baseline visit and b) patient indicates that cost is a problem during the baseline visit. The glaucoma medication cost variable was coded as yes if there was a discussion of medication cost, prescription drug insurance, and/or drug assistance programs. If there was no discussion of glaucoma medication cost in a transcript, then it was coded as no. The same process was used to determine whether the patient indicated that cost is a problem during the baseline visit. This variable was coded yes if a patient stated that he/she was having difficulty affording medications, medical visits, or other glaucoma related costs. The variable was also coded yes if the patient responded affirmatively when the physician asked him/her if cost is a problem.

### **Provider Behavior**

The next section of the coding tool measured provider communication with the following variables: a) physician asks about a glaucoma medication cost problem, b) physician proposes

a solution to a potential glaucoma-related cost problem, c) physician recommends patient work with a pharmacist to lower glaucoma medication cost, d) physician asks how much patient is paying for glaucoma medications, and e) physician recommends patient try a 3-month supply of their glaucoma medications to reduce cost. All five variables were dichotomous and were coded yes or no. Physician asking about a glaucoma medication cost problem was coded yes if a physician asked patients if they were having problems affording their glaucoma medications. Physician proposing a solution to a potential glaucoma-related cost problem was coded yes if a physician provided a patient with a way to decrease glaucoma medication cost. Physician recommending the patient work with a pharmacist to lower glaucoma medication cost, was coded yes if the physician stated that the patient should speak to a pharmacist to lower glaucoma medication cost. Physician asking how much the patient is paying for glaucoma medications, was coded yes if the physician directly asked patients how much they paid out-of-pocket for their glaucoma medications. Physician recommending the patient try a 3-month supply to reduce glaucoma medication cost, was coded yes if the physician suggested the patient get a 3-month supply instead of a 1-month supply to save money on their glaucoma medications.

### **Patient Behavior**

The next section of the coding tool measured patient communication with the following variables: a) patient had changed glaucoma medication regimen due to cost and b) patient discusses coping strategies used in the past to deal with cost problem. Both variables were dichotomous and were coded as yes or no. Patient changed medication regimen due to cost was coded yes if the patient discussed changing their glaucoma medication regimen because of cost problems at any point in the past. This included, decreasing the dosing schedule, skipping doses, decreasing the number of drops administered, and stopping medication use. Patient

discusses coping strategies used in the past to deal with a cost problem, was coded yes if the patient stated one or more coping methods they had used due to cost problems. This could include non-glaucoma related medications.

### **Insurance and Drug Cost**

Insurance and drug cost communication were measured using the following variables: a) patient health insurance or prescription drug coverage discussed, b) coinsurance discussed or copayment discussed, c) medication assistance programs discussed, d) four dollar generics discussed, and e) laser discussed as a solution to a medication cost problem. All five variables were dichotomous and were coded as yes or no. Patient health insurance or prescription drug coverage discussed was coded as yes if the physician or patient talked about medical or drug insurance coverage. Coinsurance or copayment discussed was coded as yes if the patient or physician discussed coinsurance or copayment. Medication assistance programs discussed were coded as yes if the physician or patient talked about medication assistance programs , which in our definition included medication cards and other forms of assistance. Four dollar generics are discussed was coded as yes if the physician or patient talked about four dollar generics and/or what pharmacies sell these and/or what drugs are available for this offer. Laser discussed as a solution to a cost problem was coded yes if the physician discussed the possibility of laser surgery to reduce medication costs.

### **Samples**

Communication regarding samples was measured with the following variables: a) patient requests samples, b) physician provides samples, and c) physician discusses being unable to provide samples. These three dichotomous variables were coded as yes or no. Patient requests samples was coded yes if the patient asked if samples are available for their glaucoma

medications or directly asked the physician for samples of glaucoma medications. Physician provides samples, was coded yes if the physician gave the patient glaucoma medication samples during the visit. Physician discusses being unable to provide samples was coded yes if the physician informed the patient that samples aren't available or they are unable to provide them.

### **Medication Discussion**

The coding tool measured communication concerning medications with the following variables: a) term brand or generic drug is used, b) physician initiates discussion of brand or generic, c) physician explains difference between brand and generic drugs, d) patient expresses confusion concerning brand versus generic drug, e) physician says generic isn't available, f) physician offers to write prescription for generic, g) physician asks if patient has a preference for generic or brand, h) patient expresses preference for generic, and i) patient expresses preference for brand. All nine variables are dichotomous and were coded yes or no. The term brand or generic drug is used, was coded yes if the physician or patient used the words brand or generic when describing a glaucoma medication. Physician initiates discussion of brand or generic was coded yes if the physician was the first person to mention the term brand or generic. Physician explains difference between brand and generic drugs, was coded yes if the physician described the difference between brand and generic drugs. Patient expresses confusion concerning brand versus generic drug was coded yes if the patient indicated that they were confused about the difference between brand and generic drugs. Physician says generic is not available was coded yes if physicians told patients that a medication doesn't have a generic substitution. Physician offers to write a prescription for generic was coded yes if physicians told patients they would write a prescription for a generic medication. Physician asks if patient has a preference for generic or brand was coded yes if the physician asked if the

patient would like brand or generic medication. Patient expresses preference for generic and patient expresses preference for brand, were coded yes if patients stated that they would prefer a generic or brand medication.

#### *Inter-coder Reliability*

The principal investigator coded all 275 glaucoma office visit transcripts. Thirty-five glaucoma office visit transcripts were randomly selected to be double coded by a research assistant. After the transcripts were double coded, the inter-coder reliability was assessed using an intra-class correlation coefficient (ICC). A two-way mixed ICC with consistency was used where coder effects are random and measures effects are fixed. Single measures ICC was recorded because only a portion of the transcripts was coded by two coders. Table 3 presents the inter-coder reliability for each of the communication variables. The inter-coder reliability ranged from 0.77 to 1.00 for the 35 transcripts coded by the two independent coders.

#### Outcome Variable

##### *Measurement of Adherence Variable*

Adherence for the 60 days following the baseline office visit was measured using Medication Event Monitoring Systems (MEMS). A MEMS device monitors medication adherence and records the time and date each time the container is opened. Medication adherence for the 60 days following the baseline office visit was measured three different ways using the MEMS caps:

1) Percentage of Patients That Took 80% or More of the Prescribed Doses During the 60-day Period After the Baseline Visit:

Whether patients took 80 percent or more of their prescribed doses during the 60-day period after the baseline visit was measured from the MEMS caps using the following formula:

adherence = (number of doses taken during the past 60 days divided by the number of prescribed doses) multiplied by 100. The variable was then dichotomized into adherent and non-adherent using 80% as the cutoff since it was skewed towards patients being highly adherent. The use of 80% as the cutoff is also supported by the glaucoma literature.<sup>51,78,126,136</sup>

## 2) Percentage of Patients that Took the Correct Number of Doses Each Day During the 60-day Period After the Baseline Visit:

Whether patients took the correct number of doses each day during the 60-day period after the baseline visit was measured from the MEMS caps using the following formula: adherence = (number of days doses were taken as prescribed over the past 60 days) / (60 days) multiplied by 100. The variable was then dichotomized into adherent and non-adherent using 80% as the cutoff.

## 3) Percentage of Patients That Took 80% or More of the Prescribed Doses on Time During the 60-day Period After the Baseline Visit:

Whether patients took 80 percent or more of their prescribed doses on time during the 60-day period after the baseline visit was measured from the MEMS caps and based on the dosing schedule for each patient. For patients on once a day dosing, on time was taking it every 24 hours plus or minus 6 hours. For patients on twice a day dosing, on time was taking it every 12 hours plus or minus 4 hours.

Table 4 presents the source and range for each of the three adherence variables.

**Table 4: Outcome Variables, Source, and Range**

Variable	Source	Range
<b>Outcome</b>		
Whether patients took 80% or more of their prescribed doses during the 60-day period after the baseline visit	MEMS	1= yes ( $\geq 80\%$ ); 0=no ( $< 80\%$ )

Whether patients took the correct number of doses each day during the 60-day period after the baseline visit	MEMS	1= yes ( $\geq 80\%$ ); 0=no ( $< 80\%$ )
Whether patients took 80 percent or more of their prescribed doses on time during the 60-day period after the baseline visit	MEMS	1= yes ( $\geq 80\%$ ); 0=no ( $< 80\%$ )

Since the RA was supposed to show the patient how to use the MEMS bottle with their prescribed glaucoma medication, we ignored the first day the bottle was assigned to the patient. For patients who were on more than one glaucoma medication, an adherence measure was created for each medication and then an overall adherence variable was calculated by adding together the patient's adherence for each glaucoma medication and dividing it by the number of glaucoma medications the patient was using.

## Sample Size

### *Sample Size*

Based on the data available from the parent study, there were 279 patients taking a glaucoma eye drop medication. The power calculation was estimated for whether patients took 80 percent or more of their prescribed doses during the 60-day period after the baseline visit, drove the power calculation. The study hypothesis stated that patients who had a baseline visit with a medication cost discussion would be more adherent compared to patients who did not have a baseline visit with a discussion of medication cost. Based on an analysis of the adherence data done at the beginning of the study, approximately 70% of patients took 80 percent or more of their prescribed doses during the 60-day period. Using Proc Power®, a chi-square test with unequal sample sizes estimated that a sample of 279 patients provided approximately 97% power to detect a 20% difference in the proportion of adherent patients (i.e. 70% versus 90%) between patients who did not have a baseline visit with a discussion of



medication cost and patients that did have a baseline visit with a discussion of medication cost using a two-tailed alpha of 0.05. There was 80% power to detect a 15% difference (i.e. 70% versus 85%), and 44% power to detect a 10% difference (i.e. 70% versus 80%).

Given the possible intra-correlation among patients within the same physician, generalized estimating equation (GEE) might have been a preferred method over logistic regression. However, the number of physicians (N = 15) was insufficient to perform GEE. The number of clusters depends on the number of continuous or dichotomous explanatory variables. Twenty-five clusters may be minimally enough if you have a very small number of continuous or dichotomous explanatory variables. If you have 5-12 explanatory variables, you need at least 100 clusters.<sup>137</sup> Therefore, given the small number of physicians in this study (N=15) and because prior work had shown that the intra-class correlation coefficient was less than 0.01, logistic regression was deemed a more appropriate method to analyze these data, especially since the low ICC demonstrated that communication during the visit was not correlated within clinic site or provider.<sup>138</sup>

## **Statistical Analysis**

This section describes the statistical analysis performed for the following three aims: 1) to investigate the association between physician and patient characteristics and medication cost discussion during glaucoma office visits, 2) to describe the prevalence and nature of patient-physician communication regarding medication cost during glaucoma office visits, and 3) to assess the relationship between discussion of medication cost and patient adherence to glaucoma medications over a 60-day period. First, the statistical plan to describe the patient and physician characteristics and the bivariate relationships among study variables is presented. Next, the statistical plan for each of the three aims is described.

## **Patient and Physician Characteristics**

Descriptive statistics were computed to investigate the patient, medication, and financial characteristics of the sample as well as the demographic characteristics of the physicians enrolled in the study. The following patient, medication, and financial characteristics were reported: a) age, b) gender, c) race, d) health literacy, e) glaucoma disease severity, f) patient reported comorbid conditions (high blood pressure, diabetes, high cholesterol, arthritis, hypothyroidism, heart disease, depression), g) income, h) medical insurance, i) prescription medication coverage, j) number of glaucoma medications, and k) prior glaucoma medication use (new user versus not). The following physician characteristics were reported: a) age, b) gender, c) race, d) years practicing medicine, and e) ophthalmology practice type. Next, bivariate relationships between patient, medication, financial, and physician characteristics were examined using Pearson correlation coefficients, t-tests, and chi-square tests where appropriate.

## **Statistical Analysis for Aim #1**

*Specific Aim #1: Investigate the association between physician and patient characteristics and medication cost discussion during glaucoma office visits.*

*H1: Patients who are non-African American will be more likely to discuss medication cost compared to African American patients.*

*H2: Patients with a lower income will be more likely to discuss medication cost compared to patients with a higher income.*

This analysis included only those visits that were successfully videotape recorded (N = 275). To accomplish this aim, three separate analyses were performed. First, the bivariate relationships between the patient, medication, financial, and physician characteristics and communication regarding medication cost were examined using chi-square statistics or t-tests

with a p-value of 0.05 to determine statistical significance. Next, logistic regression was used to determine what patient, medication, financial, and physician characteristics predict a discussion of medication cost. The dependent variable was discussion of medication cost. The following patient variables were included in the above model as independent variables: a) patient age, b) patient gender, c) patient race (dichotomized as African American or non-African American), d) health literacy, e) severity of disease, and f) patient self-reported arthritis. The following medication characteristics were included as independent variables for the model: a) total number of glaucoma medications and b) new or prevalent glaucoma medication user. The following financial characteristics were included as independent variables for the model: a) prescription drug coverage and b) patient indicates it is hard to pay for glaucoma medications. The following physician variables were included as independent variables for the models: a) physician age, b) physician gender, and c) ophthalmology practice type. Physician race was not included as an independent variable because there was only one non-White physician. Years practicing medicine was not used in the models because it was highly correlated with physician age.

## **Statistical Analysis for Aim #2**

*Specific Aim #2: Describe the prevalence and nature of patient-physician communication regarding medication cost during glaucoma office visits.*

*H1: The majority of baseline visits will not contain a discussion of medication cost.*

This analysis included only those visits that were successfully videotape recorded (N = 275). The patient, medication, and financial characteristics of the patients who discussed medication cost during their glaucoma office visit were calculated as percentages. The prevalence of medication cost discussions during baseline glaucoma office visits were calculated as a percentage with visits with medication cost discussion as the numerator and total glaucoma office visits as the denominator. The initiator of the cost discussions was

calculated as a percentage of patients initiating discussion and percentage of physicians initiating discussions. The number of glaucoma office visits in which a patient indicated cost was a problem was recorded as the percentage of total visits and visits in which cost was discussed. We described the nature of patient-physician communication regarding medication cost using the communication variables shown in Table 3.

### **Statistical Analysis for Aim #3**

*Specific Aim #3: Assess the relationship between discussion of medication cost and patient adherence to glaucoma medications over a 60-day period.*

*H1: Patients who have visits in which medication cost is discussed will be more adherent during the 60 days following the baseline office visit compared to patients who do not discuss medication cost according to MEMS.*

This analysis included only those patients with useable MEMS data that captured glaucoma medication adherence (N=249). First, the mean adherence was calculated according to MEMS for each of the three measures of medication adherence: a) whether patients took their prescribed doses during the 60-day period after the baseline visit, b) whether patients took the correct number of doses each day during the 60-day period after the baseline visit, and c) whether patients took their prescribed doses on time during the 60-day period after the baseline visit. Next, the percentage of patients above 80% for medication adherence was calculated for each of the three measures of medication adherence according to MEMS. Then we calculated the percent of patients that had a cost discussion for the three medication adherence measures according to MEMS broken down by the variable, patient indicates it is hard to pay for glaucoma medications. We then performed logistic regression models. The three dependent variables were the three measures of medication adherence according to MEMS. The primary independent variable was, whether medication cost was discussed. The following patient

variables were included in each of the above models as control variables: a) patient age, b) patient gender, c) patient race (dichotomized as African American and non-African American), d) health literacy, e) severity of disease, and f) patient self-reported arthritis. The following medication variables were included in each of the above models: a) total number of glaucoma medications and b) new or prevalent glaucoma medication user. The following financial pressure variables were included as control variables in each of the models: a) prescription drug coverage and b) patient indicates difficulty in paying for glaucoma medications. The following physician variables were included as control variables for each of the models: a) physician age, b) physician gender, and c) ophthalmology practice type. We recognize that in the conceptual framework, Figure II, physician characteristics are not shown as having a direct effect on adherence and therefore are not expected to be significant. However, we decided to include them in the model in order to test this assumption. We also included an interaction term in the logistic regression models, new glaucoma medication user and medication cost discussion.

We also investigated whether the provider proposed solutions to potential cost problems. Because a physician proposed a solution in only 50 visits, we were unable to perform logistic regression models for this variable. Instead, we present scatter plots showing the extent of physicians proposing solutions and patient medication adherence at the physician level. The first scatter plot presents the relationship between physicians proposing solutions and the percent of patients who took 80% or more of the prescribed doses during the 60-day period following the baseline visit stratified by physician. The second scatter plot presents the relationship between physicians proposing solutions and percent of patients who took the correct number of doses each day during the 60-day period following the baseline visit stratified by physician. The third scatter plot presents the relationship between physicians proposing solutions and the percentage of patients who took 80% or more of the prescribed doses on time during the 60-day period following the baseline visit stratified by physician. Physicians with less than 10 patients were left out of the scatter plots.

## **CHAPTER V: DESCRIPTIVE STATISTICS AND BIVARIATE ASSOCIATIONS AMONG THE INDEPENDENT VARIABLES**

### **Patient and Physician Characteristics**

Patient characteristics for the entire sample of 279 glaucoma patients are presented in Table 5. The mean patient age was 65.8 (Standard Deviation=12.8), 56% were women, 60% White/Caucasian, 36% Black/African American, and 3% Asian. The majority of patients (86%) had REALM health literacy scores of 9<sup>th</sup> grade and above. Glaucoma disease severity in the worse eye was moderate to severe in 38% of patients. Twenty-three percent of patients self-reported diabetes, 55% high blood pressure, 45% high cholesterol, 36% arthritis, 13% hypothyroidism, 15% heart disease, and 12% depression. The majority of patients (94%) reported having prescription drug coverage. Fifty-one patients were newly prescribed glaucoma medications.

The mean age of the fifteen physicians enrolled in the study was 40.8 (SD=11.7). Five of the physicians were female, fourteen were White/Caucasian, and one was Black/African American. The physicians had an average of 12.2 (SD=11.4) years practicing medicine. Eight physicians practiced in an academic medical center and the remaining 7 worked in a private ophthalmology practice.

**Table 5: Glaucoma Patient, Medication, and Financial Characteristics of Total Sample (N=279)**

<b>Characteristics</b>	<b>Percent of Total Sample (N)<sup>a</sup></b>
Women	59.1 (165)
Race	
White/Caucasian	60.1 (167)
Asian	2.5 (7)
Black/African American	35.6 (99)
Native American	0.7 (2)
Hispanic	0.4 (1)
Other	0.7 (2)
REALM Score	
9th grade and above	85.8 (235)
8th grade and below	14.2 (39)
Disease Severity	
Moderate to severe disease	38.2 (100)
Mild disease severity	61.8 (162)
Multiple Chronic Diseases	
Diabetes	22.7 (63)
High Blood Pressure	54.7 (152)
High Cholesterol	44.6 (124)
Arthritis	35.7 (99)
Hypothyroidism	13.3 (37)
Heart Disease	15.1 (42)
Depression	12.2 (34)
Annual Income	
Less than \$20,000	10.8 (30)
\$20,000-\$39,999	15.8 (44)
\$40,000-\$59,999	15.5 (43)
\$60,000-\$79,999	10.4 (29)
Greater than \$80,000	24.1 (67)
Don't want to answer or don't know	23.4 (65)
Medical Insurance	
Medicaid	4.7 (13)
Medicare	60.1 (166)
Private	72.1 (199)
Other	11.2 (31)
Patient Has Prescription Insurance	94.3 (263)
Total Number of Glaucoma Medications	
One	67.4 (188)

Two	28.3 (79)
Three or more	4.3 (12)
Newly Prescribed Glaucoma Medications	18.3 (51)
Age, mean (standard deviation) range	65.8 (12.8) 21-93
a. Totals may be less than 279 due to missing data	

### **Bivariate Results Between Patient, Medication, Financial, and Physician Variables**

Tables 6, 7, and 8 present the correlation matrices of patient, medication, financial, and physician characteristics. These patient, medication, financial, and physician characteristics were used as covariates in the logistic regression models in the following sections. The purpose of assessing these relationships is to look at the potential impact the relationships could have on the logistic regression models. Also, it is important to assess correlations to rule out problems of multicollinearity.

Table 6 presents the bivariate relationships among patient, medication and financial characteristics using Pearson Correlations, t-tests, and chi-square tests where appropriate. Female patients were more likely to be older compared to male patients (t-test = -2.24; p = 0.03). Female patients were more likely to report arthritis compared to male patients (Pearson Chi-square = 8.42; p-value = 0.02). African American patients were more likely to be younger compared to non-African American patients (t-test = 4.03; p-value < 0.001). Patients that self-reported arthritis were older compared to those that did not report arthritis (t-test = -4.89; p-value < 0.001). African American race and REALM score were positively associated (Pearson Chi-square = 22.56; p-value < 0.001). African American patients had higher REALM scores compared to non-African American patients. African American race and prescription drug coverage were negatively associated (Pearson Chi-square = 6.67; p-value = 0.01). African American patients were less likely to have prescription drug coverage compared to non-African American patients. African American race was negatively associated with annual income



(Pearson Chi-square = 16.39; p-value < 0.001). African American patients had lower income compared to non-African American patients. REALM score was negatively associated with disease severity (Pearson Chi-square = 5.55; p-value = 0.02). Patients with higher REALM scores had less disease severity compared to patients with lower REALM scores. REALM score was positively associated with annual income (Pearson Chi-square = 32.24; p-value < 0.001). Patients with higher REALM scores had higher income compared to patients with lower REALM scores. Disease severity was positively associated with the number of glaucoma medications a patient is taking (Pearson Chi-square = 10.87; p-value = 0.001). Patients with more severe glaucoma took more glaucoma medications compared to patients with less severe glaucoma. The number of glaucoma medication a patient is taking was negatively associated with being a new glaucoma medication user (Pearson Chi-square = 23.38, p-value < 0.001). Patients taking more glaucoma medications were less likely to be a new glaucoma medication user.

**Table 6: Correlation Matrix Assessing Relationships Among Patient, Medication and Financial Characteristics**

	Patient age	Patient gender - Female	African American Race	REALM-Health literacy measure for patients	Severity of disease	Patient self-reported arthritis	Total number of glaucoma medications patient is taking	Patient is newly initiated on glaucoma medications	Patients annual income	Patients insurance status	Does patient have prescription drug insurance
Patient age	1										
Patient gender - Female	0.134*	1									
African American Race	-0.236**	0.07	1								
REALM-Health literacy measure for patients	0.046	-0.044	0.287**	1							
Severity of disease	0.056	-0.016	0.008	0.147*	1						
Patient self-reported arthritis	0.282**	0.174**	-0.109	0.082	N/A	1					
Total number of glaucoma medications patient is taking	0.09	-0.013	0.026	0.004	0.204**	N/A	1				
Patient is newly initiated on glaucoma medications	-0.079	0.054	-0.074	-0.034	0.038	N/A	-0.289**	1			
Patients annual income	-0.068	0.031	-0.089	-0.221**	0.007	N/A	0.012	0.013	1		
Patients insurance status	0.076	-0.04	-0.045	N/A	N/A	N/A	0.014	N/A	N/A	1	

Does patient have prescription drug insurance	0.065	-0.017	0.155**	-0.077	-0.043	N/A	0.007	N/A	N/A	0.355**	1
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p<0.05, \*\* p<0.01, \*\*\* p<0.001; N/A refers to relationships we were unable to examine due to small sample sizes

Table 7 presents the bivariate relationships among physician demographics. Physician age was negatively associated with female physician gender (t-test = 16.00; p-value < 0.001). Female physicians were younger than the male physicians. Physician age was positively associated with years practicing medicine (Pearson Correlation = 0.89; p-value < 0.001). This finding makes sense, since older physicians would have more time to practice medicine than younger physicians. In the logistic regression models in the following sections, we will only use physician age. Female physician gender was negatively associated with years practicing medicine (t-test = 11.36; p-value < 0.001). Again, this finding makes sense since the female physicians were younger. In the logistic regression models in the following sections we only used physician age, practice type, and gender. Private ophthalmology practice type was positively associated with years practicing medicine (t-test = -3.80; p-value < 0.001). Physicians practicing in a private ophthalmology office were practicing medication longer than physicians.

**Table 7: Correlation Matrix Assessing Relationships Among Physician Characteristics**

	Physician age	Physician gender - Female	Private Ophthalmologist practice type	Physician years practicing medicine
Physician age	1			
Physician gender - Female	0.474**	1		
Private Ophthalmologist practice type	0.09	0.064	1	
Physician years practicing medicine	0.891**	0.355**	0.268**	1

p<0.05, \*\* p<0.01, \*\*\* p<0.001

Table 8 presents the bivariate relationships among patient, medication, financial, and physician characteristics. Patient age and physician years practicing medicine were negatively correlated (Pearson Correlation = -0.12; p = 0.040). Older patients were more likely to have a physician with less years practicing medicine compared to younger patients. The number of glaucoma medication a patient is taking was negatively associated with a private ophthalmology practice type (Pearson Chi-square = 4.46; p-value = 0.035). Patients taking more glaucoma medications were less likely to go to a private ophthalmology practice compared to patients taking less glaucoma medications. Patient status as a new glaucoma medication user was positively associated with a private ophthalmology practice type (Pearson Chi-square = 4.40; p-value = 0.04). New glaucoma medication users were more likely to go to private ophthalmology practices compared to prevalent glaucoma medication users.

**Table 8: Correlation Matrix Assessing Relationships Among Patient and Physician Characteristics**

	Patient gender - Female	Patient age	African American Race	REALM-Health literacy measure for patients	Severity of disease	Patient self-reported arthritis	Total number of glaucoma medications patient is taking	Patient is newly initiated on glaucoma medications	Patients annual income	Patients insurance status	Does patient have prescription drug insurance
Physician age	0.008	-0.065	-0.11	-0.029	-0.038	0.042	-0.106	0.028	-0.063	-0.075	0.006
Physician gender - Female	-0.029	0.021	-0.019	-0.092	0.073	-0.011	-0.004	0.015	0.078	0.086	-0.016
Private Ophthalmologist practice type	0.05	0.049	-0.291**	-0.064	-0.033	0.116	-0.126*	0.126*	-0.045	0.025	0.09
Physician years practicing medicine	0.06	-0.123*	-0.088	-0.066	-0.004	0.034	-0.105	0.074	0.004	-0.049	0.08

p<0.05, \*\* p<0.01, \*\*\* p<0.001

## CHAPTER VI: AIM 1 RESULTS

### Results of Aim 1 – Investigate the Association between Physician and Patient

#### Characteristics and Medication Cost Discussion during Glaucoma Office Visits

*H1: Patients who are non-African American will be more likely to discuss medication cost compared to African American patients.*

*H2: Patients with a lower income will be more likely to discuss medication cost compared to patients with a higher income.*

This section describes the results of the statistical analysis of Aim 1. First, the bivariate results of medication cost communication by patient, medication, financial and physician variables are described. Next, the bivariate results of medication cost initiator by patient, medication, financial, and physician variables are described. Last, the results of the logistic regression models predicting discussion of medication cost are presented.

#### **Bivariate Results – Medication cost communication by patient, medication, financial, and physician variables**

Table 9 shows the bivariate relationships between communication regarding medication costs and the patient, medication, financial, and physician variables. Examining patient characteristics, there were no significant differences between those who did and did not discuss glaucoma medication cost. Non-African American patients were not significantly more or less likely to discuss medication cost than African American patients. This finding does not support our first hypothesis that patients who are non-African American would be more likely to discuss medication cost compared to African American patients. We also analyzed the bivariate relationship between patient income and discussion of medication cost. Patient income was not

significantly related to any outcome. This finding does not support our second hypothesis that patients with a lower income would be more likely to discuss medication cost compared to patients with a higher income.

When examining physician characteristics, there were no significant differences between those who did and did not discuss glaucoma medication cost. Examining medication characteristics, there was one significant difference between patients who discussed medication cost and those who did not. Forty-five percent of patients who were newly prescribed glaucoma medications discussed medication cost while only 29% of prevalent glaucoma medication users discussed medication cost (Pearson chi-square = 5.25;  $p = 0.022$ ).

When examining financial characteristics, there was one significant difference between patients who discussed medication cost and those who did not. Fifty-six percent of patients with no prescription coverage discussed medication cost while only 30% of patients who had prescription drug coverage discussed medication cost (Pearson Chi-square = 4.76;  $p = 0.029$ ). It is important to note that 94% of patients reported having prescription drug coverage. No other financial characteristics differed significantly between those who did and did not discuss medication cost.

**Table 9: Patient, Medication, and Financial Characteristics by Whether Medication Cost Was Discussed During Medical Visit (N=275)**

Variable	Medication Cost Communication	
	Yes (N=87) Percent (N)	No (N=188) Percent (N)
<b>Patient Characteristics</b>		
Gender		
Female	30.9 (50)	69.1 (112)
Male	32.7 (37)	67.3 (76)
Age, mean (std dev)	66.2 (11.7)	65.7 (13.4)
Race		
African American	31.6 (31)	68.4 (67)
Non-African American	31.3 (55)	68.7 (121)

REALM Score		
9th grade and above	32.9 (76)	67.1 (155)
8th grade and below	25.6 (10)	74.4 (29)
Glaucoma severity		
Moderate to severe	34.0 (33)	66.0 (64)
Mild	31.7 (51)	68.3 (110)
Chronic Diseases		
Arthritis	32.3 (32)	67.7 (67)
Depression	29.4 (10)	70.6 (24)
Annual Income		
Less than \$20,000	3.2 (9)	7.6 (21)
\$20,000-\$39,999	5.8 (16)	10.1 (28)
\$40,000-\$59,999	3.2 (9)	12.2 (34)
\$60,000- \$79,999	2.9 (8)	7.2 (20)
Greater than \$80,000	8.3 (23)	14.7 (41)
Don't want to answer or don't know	7.6 (21)	15.8 (44)
Prescription drug coverage		
No coverage	56.3 (9)	43.7 (7)*
Partial or generous coverage	30.1 (78)	68.9 (181)
Number of glaucoma medications		
One	33.9 (63)	66.1 (123)
Two	24.7 (19)	75.3 (58)
Three or more	41.7 (5)	58.3 (7)
Glaucoma medication use		
Newly prescribed medications	45.1 (23)	54.9 (28)*
Prevalent user	28.6 (64)	71.4 (160)
Patient indicates it is hard to pay for prescriptions	45.8 (11)	54.2 (13)
<b>Physician characteristics</b>		
Gender		
Female	32.8 (20)	67.2 (41)
Male	31.3 (67)	68.7 (147)
Age, mean (std dev)	44.7 (11.0)	42.9 (9.8)
Practice type		
Private practice	34.0 (34)	66.0 (66)
Academic medical center	30.3 (53)	69.7 (122)



\* p<0.05, \*\* p<0.01, \*\*\* p<0.001 a. Totals may be less than 87 and 188 due to missing values T-tests and chi-square tests

### Logistic Regression – Predicting Medication Cost Discussion

Table 10 presents the results of the logistic regression model with all of the patient, medication, financial, and physician predictors. The Hosmer and Lemeshow goodness of fit test was not significant suggesting the model has adequate fit ( $p = 0.55$ ). The results indicate that patients who are new to glaucoma medications are 2.91 times more likely to discuss medication cost than patients who are already on glaucoma medications ( $OR = 2.91$ ;  $p = 0.005$ ; 95% CI = 1.38, 6.12). Patients who indicated it was hard to pay for glaucoma medications to the research assistant during the post-visit interview were 3.38 times more likely to discuss medication cost than patients who did not indicate it was hard to pay for their medications ( $OR = 3.38$ ;  $p = 0.019$ ; 95% CI = 1.23, 9.30). Patient race was not significantly associated with medication cost discussion. Again, this finding does not support our hypothesis that Non-African American patients would be more likely to discuss medication cost compared to African American patients.

**Table 10: Logistic Regression Results Predicting Communication Concerning Medication Cost During Glaucoma Office Visits (N=275)**

Independent Variables	Beta	S.E.	p-value	Odds Ratio	95% C.I.
Patient gender-Female	-0.288	0.304	0.343	0.750	(0.413,1.360)
Patient age	0.019	0.012	0.119	1.020	(0.995, 1.045)
Patient race-African American	0.167	0.348	0.632	1.182	(0.597, 2.339)
Health literacy-8th grade and below	-0.646	0.463	0.163	0.524	(0.212, 1.299)
Disease severity-	0.111	0.31	0.719	1.118	(0.608, 2.054)

mild/moderate					
Arthritis	-0.075	0.314	0.811	0.928	(0.502, 1.715)
Physician gender- Female	0.416	0.399	0.296	1.517	(0.694, 3.312)
Physician age	0.032	0.017	0.054	1.033	(0.999, 1.068)
Practice type-private	-0.168	0.324	0.603	0.845	(0.448, 1.594)
Number of glaucoma medications - two or more	-0.267	0.340	0.432	0.766	(0.393, 1.491)
New glaucoma medication user	1.068	0.380	0.005	2.908	(1.381, 6.123)
Prescription drug coverage	-1.074	0.599	0.073	0.342	(0.106, 1.106)
Hard to pay for prescriptions	1.217	0.517	0.019	3.378	(1.226, 9.304)

## Summary

In the Aim 1 analysis we investigated the relationship between a discussion concerning medication cost and the patient, medication, financial, and physician characteristics. The bivariate results revealed that patients without prescription drug coverage were more likely to discuss cost than patients with prescription drug coverage. Additionally, patients who were newly prescribed glaucoma medications were more likely to discuss cost than prevalent glaucoma medication users.

The multivariable logistic regression models revealed two significant predictors of medication cost discussions: 1) new glaucoma medication user and 2) patient reports it is hard to pay for prescriptions. Prescription drug coverage was not a significant predictor of medication cost discussions once you control for patient, physician, medication, and financial variables. The multivariable results differed from the bivariate results because in these models, multiple covariates were being controlled for.

The results from the bivariate analysis and the multivariable logistic regression models led us to reject hypothesis one which stated, Non-African American patients are more likely to discuss medication cost compared to African American patients. The bivariate analysis and logistic regression model results also led us to reject hypothesis two which stated, patients with a lower income are more likely to discuss medication cost compared to patients with a higher income.

## **CHAPTER VII: AIM 2 RESULTS**

### **Results of Aim 2 – Describe the Prevalence and Nature of Patient-Physician Communication Regarding Medication Cost During Glaucoma Office Visits**

*H1: The majority of baseline visits will not contain a discussion of medication cost.*

#### **Glaucoma Office Visit Videotape Analysis and Prevalence of Cost Communication**

Out of the 279 glaucoma office visits, 275 were successfully videotape recorded. The qualitative results describing patient-provider communication during the glaucoma office visits are based on the 275 patients with available recordings. The mean length of the glaucoma office visits was 20.3 (SD = 18.8) minutes.

Patient-provider communication concerning medication costs occurred in 31.6% (87) of the visits. This finding supports our hypothesis that the majority of baseline visits would not contain a discussion of medication cost. Eleven visits (4%) had two cost discussion segments and one visit had three cost discussion segments. Physicians initiated the majority (60.6%) of all cost discussions.

#### **Patient, Medication, and Financial Characteristics of Patients who Discussed Medication Cost During Glaucoma Office Visit**

The patient, medication, and financial characteristics of patients who discussed medication cost during their glaucoma office visit are shown in Table 11. The demographic characteristics are similar to the overall sample.

**Table 11: Glaucoma Patient, Medication, and Financial Characteristics of Patients Who Discussed Medication Cost During Their Office Visit (N = 87)**

<b>Characteristics</b>	<b>Cost Discussion Occurred Percentage of Patients (N)<sup>a</sup></b>
Women	57.5 (50)
Age, mean (range)	66.2 (38-93)
Race	
White/Caucasian	58.1 (50)
Asian	4.7 (4)
Black/African American	36.0 (31)
Native American	1.2 (1)
REALM Score	
9th grade and above	88.4 (76)
8th grade and below	11.6 (10)
Disease Severity	
Moderate to severe disease	39.3 (33)
Mild disease severity	60.7 (51)
Other Chronic Diseases	
Diabetes	24.4 (21)
High Blood Pressure	60.5 (52)
High Cholesterol	53.5 (46)
Arthritis	37.2 (32)
Hypothyroidism	10.5 (9)
Heart Disease	16.3 (14)
Depression	11.6 (10)
Annual Income	
Less than \$20,000	10.5 (9)
\$20,000-\$39,999	18.6 (16)
\$40,000-\$59,999	10.4 (9)
\$60,000-\$79,999	9.3 (8)
Greater than \$80,000	26.7 (23)
Don't want to answer or don't know	24.4 (21)
Medical Insurance	
Medicaid	1.2 (1)
Medicare	57.0 (49)
Private	34.9 (30)
Other	3.5 (3)
Patient Has Prescription Insurance	89.7 (78)
Total Number of Glaucoma Medications	
One	72.4 (63)

Two	21.8 (19)
Three or more	5.7 (5)
Newly Prescribed Glaucoma Medications	26.4 (23)

a. Totals may be less than 87 due to missing data

### **Nature of Patient-Provider Communication During Glaucoma Office Visits**

This section describes the nature of patient-provider communication regarding glaucoma medication cost. Table 12 presents a summary of the percentage and frequency each of the communication variables was discussed. Each of the communication variables are further discussed below with an example patient statement from the glaucoma office visit transcripts.

**Table 12: Percentage and Number of Visits Where the Communication Variables Were Discussed (N=275)**

Communication Variable	Percent (N) of Visits Where Variable was Discussed
<b>Overall Medication and Other Cost Discussion</b>	
Medication Cost Discussed During the Baseline Visit	31.6 (87)
Patient Indicates that Cost is a Problem during the Baseline Visit	4.7 (13)
<b>Provider Behavior</b>	
Physician Asks About a Glaucoma Medication Cost Problem	1.4 (4)
Physician Proposes a Solution to a Potential Glaucoma-Related Cost Problem	17.9 (50)
Physician Recommends Patient Work with Pharmacist to Lower Glaucoma Medication Cost	1.1 (3)
Physician Asks How Much Patient is Paying for Glaucoma Medications	2.2 (6)
Physician Recommends Patient Try a 3-Month Supply of Glaucoma Medications to Reduce Cost	2.2 (6)
<b>Patient Behavior</b>	
Patient had Changed Glaucoma Medication Regimen Due to Cost Problem	6.1 (17)
Patient Discusses Coping Strategies Used in the Past to Deal with Cost Problem	1.8 (5)
<b>Insurance and Drug Cost</b>	

Patients Health Insurance or Prescription Drug Coverage is Discussed	14.7 (41)
Coinsurance or Copayment is Discussed	11.1 (31)
Medication Assistance Programs are Discussed	2.2 (6)
Four Dollar Generics are Discussed	2.5 (7)
Laser is Discussed as a Solution to a Medication Cost Problem	0.4 (1)
<b>Samples</b>	
Patient Requests Samples	0.0 (0)
Physician Provides Samples	6.5 (18)
Physician Discusses Being Unable to Provide Samples	0.7 (2)
<b>Medication Discussion</b>	
Term Brand or Generic is Used	19.0 (53)
Physician Initiates Discussion of Brand or Generic	14.7 (41)
Physician Explains Difference Between Brand and Generic	0.7 (2)
Patient Expresses Confusion Concerning Brand versus Generic	0.7 (2)
Physician Says Generic isn't Available	3.2 (9)
Physician Offers to Write a Prescription for Generic	8.6 (24)
Physician Asks if Patient has a Preference for Generic or Brand	3.6 (10)
Patient Expresses Preference for Generic	6.1 (17)
Patient Expresses Preference for Brand	1.8 (5)

#### *Overall Medication and Other Cost Discussions*

As mentioned earlier, 87 of the 275 successfully videotape recorded office visits, contained a medication cost discussion. Patients indicated that cost was a problem in 4.7% (13) of the visits. The three examples below were statements made by glaucoma patients indicating that cost was a problem.

##### Example 1

Patient: How much does this cost because I don't have insurance?

##### Example 2

Patient: Well I quit using the Xalatan because I didn't have any insurance or anything to help me pay for it.

There were two statistically significant differences between patients who indicated cost was a problem and those that did not. Among patients with no medical insurance, 28.6% indicated cost was a problem while only 4.1% of patients with medical insurance indicated cost was a problem (Pearson chi-square = 0.07;  $p = 0.003$ ). It's important to be cautious when interpreting these results because 97.5% of patients reported having medical insurance. The majority of patients (91.7%) who indicated cost was a problem were Non-African American (Pearson chi-square = 4.11;  $p = 0.043$ ).

#### *Provider Behavior*

Physicians asked about a medication cost problem in four of the videotape recorded glaucoma office visits. The physician statement examples below were made during the glaucoma office visits to evaluate a medication cost problem.

##### Example 1

Physician: Any problems affording them? You're OK with that?

##### Example 2

Physician: Any problems with cost?

Physicians proposed a solution to a potential cost problem in 17.9% (50) of the videotape recorded glaucoma office visits.

##### Example 1

Physician: Now if you have trouble with that brand because of your pharmacy benefit plan just call the office and we'll get you a different brand. There are three brands right now that are about the same. So if they don't work well it depends on which company pays them off more.

##### Example 2



Physician: Actually this medication just became generic that's um like I said its one a day dose and there's other medications we can use if we find Xalatan is too expensive for you.

#### Example 3

Physician: Um we also discussed the cost factor and it sounded like the Travatan uh was a little costly and maybe uh switching you to a generic called Latanoprost which is in the family of medications would be helpful. It should be cheaper for you.

Physicians proposed a solution to a potential cost problem in 22.0% of visits where patients were taking one glaucoma medication and during 10.1% of visits where patients were taking two or more glaucoma medications (Pearson chi-square = 5.76;p = 0.016). In addition, physicians proposed a solution to a potential cost problem in 14.7% of visits with prevalent glaucoma medication users and 33.3% of visits with patients starting glaucoma medications for the first time (Pearson chi-square = 9.66;p = 0.002).

Physicians recommended that patients work with their pharmacist to lower medication cost in three of the videotape recorded glaucoma office visits. The following is an example of how physicians suggested patients utilize their pharmacist to lower medication costs.

#### Example 1

Physician: You can ask the pharmacy. Why don't you do this just ask your pharmacist what it would be for 3 months. Often um it is not 3 times. You know they give you a little bit of a discount for getting sometimes.

Physicians asked the patient how much they were paying for their medications in 2.2% (6) of the videotape recorded glaucoma office visits.

#### Example 1

Physician: Do you know how much you're paying for it now?

#### Example 2

Physician: And how much did it cost?

#### Example 3

Physician: What are you paying for a copay? I'm just curious.

Physicians recommended their glaucoma patients try a 3-month supply to reduce medication cost in six of the videotape recorded glaucoma visits. The examples below are statements that physicians made during the glaucoma office visits.

#### Example 1

Physician: Let's go back on that. Twice a day. And if I write a three months supply do you get a break with that? Is that how it works?

#### Example 2

Physician: We can prescribe it so you get three bottles at a time but actually usually get a discount for that for the generics like the Timolol. They'll give it to you I think its ten dollars um for three months versus four dollars per month or something like that. Not a big difference but.

#### Example 3

Physician: Most places um and I believe Walmart is included in this will give a discount if you do three months at a time. Instead of a month at a time. If they know what you're ordering but I will see if that will help you.

### *Patient Behavior*

Patients discussed changing their medication regimen because of a cost problem in 6.1% (17) of the videotape recorded glaucoma office visits. The following examples are statements made by glaucoma patients where they discuss changing their medication regimen due to a cost problem.

#### Example 1

Patient: Um I was going to ask you um a friend of mine told me over at \_\_\_\_ on \_\_\_\_ they have a pharmacy and they sell prescription on their list for \$4. Where this little drop you gave me are \$45 and the first ones were \$90 holy mackerel and I couldn't afford it so the pharmacist over there marked the common ones that he said they usually get but he said he didn't know if um would do.

#### Example 2

Patient: Um sometime maybe I forget purposely because they're so darn expensive I mean I figure if I use them half as much I'll only pay half the money.

#### Example 3

Patient: Yeah well there is some kind of generics right that I could use?

#### Example 4

Patient: Yes I want to know should I get the prescription filled? Is it expensive because my friend says it is? Yeah should I request not to take the medication because I'm so cheap?

#### Example 5

Patient: Well I quit using the Xalatan because I didn't have any insurance or anything to help me pay for it.

Patients discussed coping strategies used in the past to deal with cost problems in five of the videotape recorded glaucoma office visits.

#### Example 1

Patient: I changed some other medications I got generic and some of blood pressure stuff and all. And uh, and so basically all my other medications are free.

### *Insurance and Drug Cost*

Patients and physicians discussed health insurance or prescription drug coverage in 14.7% (41) of the videotape recorded glaucoma office visits. The following are some example patient and physician statements regarding health insurance and prescription drug coverage.

#### Example 1

Physician: Because this drop even though it's working well your pressure works well and stuff like that it's making you unhappy and medication shouldn't make you unhappy they should make you feel better. Um there are other generics believe it or not of the same medication um there's also the option of going back to the Xalatan um brand name and we can write it that you had an adverse effect um to the generic in terms of the insurance.

#### Example 2

Physician: Um you know if you wanted to check and find out if that medicine is cheaper on your insurance plan, we're happy to switch you over.

#### Example 3

Patient: Yeah because I was on um when I first started I was on something totally different and they put me on this one because my insurance was all freaky.

A higher proportion of patients discussed health insurance or prescription drug insurance if they were starting glaucoma medications for the first time compared to patients already on glaucoma medications (Pearson chi-square = 10.38;  $p = 0.001$ ). No other patient, medication, financial, or physician characteristics were significantly different between patients who discussed health insurance or prescription drug insurance and patients who did not.

Coinsurance or copayment was discussed in 11.1% (31) of videotape recorded glaucoma office visits. The following are some example patient and physician statements related to coinsurance and copayment.

#### Example 1

Patient: How expensive is this stuff?

Physician: Well, full price without insurance coverage it's pretty expensive, probably over one hundred dollars a bottle depending on the pharmacy.

#### Example 2

Patient: You know that health plan insurance has increased the copays? Now it cost sixty-two dollars for that Travatan.

Medication assistance programs were discussed in six of the visits. The examples below are statements made by physicians relating to medication assistance programs.

#### Example 1

Physician: So you have no insurance well we'll try to give it uh um are you, we'll try to submit it to \_\_\_\_ (name of company) has an insurance plan one of these things for needy people. If not we'll try to supply it to you. How does that sound?

#### Example 2

Physician: The other question is a card that for the rest of the year um it would get you the prescription for only twenty-five dollars a bottle. So that should save you some money. I don't know about that only the instruction. You have to read it and register.

#### Example 3

Physician: Ok here's a prescription and this gets you a free thirty-day trial. You can't beat that. It's like seventy dollars without that. Then we have some other certificates we can give you.

Four dollar generics were discussed in seven of the videotape recorded glaucoma office visits. The following are some example patient and physician statements relating to four dollar generics.

#### Example 1

Physician: Okay I'm going to write down add Pilocarpine and I would go to Walmart or Target it's on the four dollar list, if it's not too much out of your way.

#### Example 2

Patient: How much do you think it'll really be cause?

Physician: I don't know, I don't know what it'll be. That's a good question because some of the generics have been around for a long time and are as low as \$4 a month.

#### Example 3

Physician: The other one Timolol is available generic and its actually included in those places that have the \$4 generics. So it's literally \$4 and not \$10, which is usually the deciding factor for a lot of people.

Laser as an alternative to glaucoma medications was discussed as a solution to a medication cost problem in one of the videotape recorded glaucoma office visits. The conversation regarding laser is provided below.

#### Example 1

Patient: Well I quit using the Xalatan because I didn't have any insurance or anything to help me pay for it and it's so expensive. But I did keep using the Asopt.

Physician: Well let's see what other options we have. Um do you have some trouble with wheezing or asthma, emphysema? Is that right? There's one medication we sometimes use um, that's not good if you have breathing problems. Um there's another one that we sometimes use. Um that has a purple top on it. Um, it comes in either a green bottle with a purple top or a white bottle with a purple top called um Brimonodine or Alphagan. Do you recall if you've ever been on that?

Patient: Alphagan, I believe I've been on that.

Physician: That rings a bell? It's um it's the reason I ask is that it is available in a generic form. So it shouldn't be expensive um as the Xalatan. I understand the Xalatan is going to become generic sometime in the next few months so the price should come down on it significantly. I don't know exactly when that'll be though. Um and they quit giving out samples because they're going to be out in a generic so I don't have any samples to give you. Would you like to try the Brimonidine which is the purple top on the, it's available in generic? If it works then you'd be able to use that.

Patient: Well I've been allergic to different kinds that I don't think that I've ever had been on that one.

Physician: Let me look and see if I can find a record of it. I don't oh you may have been on that one. We have a note that you were on allergic to Alphagan which is the brand name form of that. I have another idea! The laser. We did that laser back somewhere around May of 2009. So that's been almost two years. The laser tends to work for one to two years and then the effect wears off so you may be seeing the effect wear off. But it can be repeated. So rather than putting you on a drop that you might be allergic to, we might want to consider repeating the laser. If the laser doesn't work because it doesn't work on everybody every time, we could still use the drop. It doesn't prevent us from trying the drop. But if it works then, you know, you may not have to do another one. Why don't we give that a try?

In this example the physician reviews possible treatment options with the patient that may help to reduce the cost. First, they discuss different glaucoma medications and then the possibility of laser.

### *Samples*

There were no videotape recorded glaucoma office visits where a patient requested samples from a physician. Physicians discussed providing samples to their patients in 6.5% (18) of videotape recorded glaucoma office visits. Physicians when providing glaucoma medication samples made the following statements.

#### Example 1

Physician: Give you a sample to get started ok?

#### Example 2

Physician: That was Travatan so you switched to Lumigan and apparently you did better with Lumigan. So I guess what I would suggest is we try the Lumigan and let me just give you a sample to see if that works. Ok?

### Example 3

Physician: Um I think I've got some Travatan samples, so in fact I know I do.

There was a significant difference in the type of practice an ophthalmologist worked in and providing glaucoma medication samples. In private practices, 13% of glaucoma office visits had a discussion of physicians providing samples while in academic medical centers, 2.9% of glaucoma office visits had a discussion of physicians providing samples (Pearson chi-square = 10.70;  $p = 0.001$ ). There were significant differences in the discussion of physicians providing samples and patients being new or prevalent glaucoma medication users. Ten patients (19.6%) on glaucoma medications for the first time had a physician discuss samples while eight (3.6%) prevalent glaucoma medication users had a physician discuss providing samples (Pearson chi-square = 17.47;  $p < 0.0001$ ). Physicians discussed providing samples in 25% of visits with patients who did not have prescription drug insurance and 5.4% of visits with patients who did have prescription drug insurance (Pearson chi-square = 9.46;  $p = 0.002$ ).

Physicians discussed being unable to provide sample in two of videotape recorded glaucoma office visits. The physician statements are below.

### Example 1

Physician: Um they quit giving out samples because um, because they're going to be out in a generic so, um, I don't have any samples to give you. Um, would you like to try the Brimodine which is the purple top on the, its available generic? If it works then you'd be able to use that.

### Example 2

Physician: Um in terms of there's a I can see, you know I don't think we have any samples. But we can give you a prescription.

### *Medication Discussion*

The term brand or generic was used in 19.0% (53) of the videotape recorded glaucoma office visits. The following are some example patient and physician statements.

#### Example 1

Patient: Now is this the kind of thing you have a generic version and a main brand version?

#### Example 2

Patient: Um, we have a question. Is there a generic?

Physician: So there is not a generic for Travatan but Travatan does have a cousin um of a medicine called Xalatan. And that has just recently become generic a few months ago.

There were no statistically significant patient, medication, financial, or physician characteristic differences between patients who had office visits where the term brand or generic were used and those that did not.

Physicians initiated a discussion of brand or generic glaucoma medications in 14.7% (41) of videotape recorded glaucoma office visits. The following are some example physician statements.

#### Example 1

Physician: Do you take the generic or the brand name?

#### Example 2

Physician: The drops you started is from a class of drugs that's usually our first choice when we treat glaucoma and there are no generic in that.

There were no statistically significant patient, medication, financial, or physician characteristic differences between patients that had a glaucoma office visit where the physician initiated the discussion of brand/generic and those that did not.



Physicians explained the difference between brand and generic medications in two of the videotape recorded glaucoma office visits. The examples below are explanations the physicians gave regarding the differences between brand and generic medications.

#### Example 1

Physician: So um just for the first time if you wanted to go a generic became available in that same class as Travatan. It's not the exact same medication. It's in the same family. So actually most of my patients switched to that generic because it's less expensive. And it um it's not necessarily any better, but it seems to work just as well for most people. Um if you want to try the generic we can see how it works for you. If it doesn't work then we can always switch you back.

#### Example 2

Physician: There is a generic um formulation of it. It's not you know there's some generics that are multiple dose drops. Not as effective generally in terms of pressure lowering. They're really cheap generics but this one does have a generic it won't be like five dollars or ten drop but it may be cheaper for you. So I can either write it as a brand name with alternatives allowed or we can just go ahead and start with the generic if you want to try the generic, which is Latanoprost, is the generic for Xalatan. It's a little bit different but the molecule is a little bit different from what I'm prescribing. It's basically a similar molecule. It's a pretty new generic so we don't have a lot of data yet on um you know.

Patient: So do you think it would be OK to use it on?

Physician: I think so and I do use it in patients so I don't have a problem using it. It's just that the standards for um concentration and the leeway is a little bit greater in generics then you have with the brand name. But I've had you know patients that do fine.

Patients expressed confusion concerning brand versus generic medications in two of the videotape recorded glaucoma office visits. The discussion below occurred in the visit where a patient expressed confusion of brand versus generic medications.

#### Example 1

Physician: Do you take the generic or the brand name? What does the bottle look like?

Patient: Now I'm telling you I used to take uh generic um Timolol but they the last time the pressure wasn't down to like eighteen, seventeen so they went back and put me on the Cosopt which is so expensive but anyways that's where I think its so I can get the drop I mean the pressure down.

Physician: My question to you is, that Cosopt brand name or generic? Does the bottle look like a bottle like this?

Patient: It's not generic.

Physician: It's not generic?

Patient: It they changed it so that I could go back on the real Cosopt. I mean you know its generic but it's not generic. You see what I'm saying?

Physician: I think so. It's different than the Timolol. The Timolol is generic and that's one medication but the Cosopt is Timolol plus another medication called Dorzolamide.

Patient: Right right but I'm on...

Physician: There's brand named Cosopt. And now there's generic Cosopt.

Patient: No I'm on brand named.

Physician: Which is Timolol.

Patient: No I'm on the brand named. Was on it but because the pressure wasn't where they wanted it they put me back on.

Physicians said that generic medications weren't available in nine of the videotape recorded glaucoma office visits. The following examples are statements made by physicians that discussed generic medications being unavailable.

#### Example 1

Physician: There's no generic equivalent unfortunately.

#### Example 2

Physician: All of the medications in this class, there is no generic. Usually there is one that is preferred on the formulary, um I am writing a prescription for one that is going to become generic next year.

Physicians offered to write a prescription for a generic glaucoma medication in 8.6% (24) of the videotape recorded glaucoma office visits. The following are some physician statements.

#### Example 1

Physician: Ok um the other thing we may have talked about this in the past and stop me if we have but the um there's now a generic form of well it's a cousin of Travatan. So that's brought the price down for a lot of people. Um it used to be about eighty dollars without um without a copay now its down to twenty something dollars. We can always switch you over to the generic now. It's only been since about March or April that it's been available so that's bee really wonderful for a lot of my patients. Pretty much all of my patients have switched to the generic so it's a good thing to do. And the other two that you're on are available in a generic. They're still not you know nothing but at least they're better than if they were.

#### Example 2

Physician: And in your case you know once a day and that will help keep the pressure at a steady level and reduce the risk for developing loss of vision over time. Um we also discussed the cost factor and it sounded like the Travatan uh was a little costly and

maybe uh switching you to a generic called Latanoprost which is in the same family of medications would be helpful. It should be cheaper for you.

### Example 3

Physician: Uh Travatan has a generic equivalent. Xalatan comes in a generic. It's just as effective as Travatan and so I'm OK with changing it over.

Patient: Let's do that yes.

All twenty-four of the glaucoma office visits where a physician offered to write a prescription for a generic medication as an alternative to a brand medication took place at an academic medical center. The number of years physicians practiced was significantly different between patients who had a visit where the physician offered to write a prescription for a generic medication (t-test = -2.04;  $p = 0.05$ ; 95%CI = -6.18,-0.02). Physicians who had practiced medicine longer were less likely to offer to write a prescription for a generic medication.

Physicians asked if the patient had a preference for brand versus generic glaucoma medications in 3.6% (10) of the videotape recorded glaucoma office visits. Examples of physicians asking if patients had a preference for brand or generic medications are below.

### Example 1

Physician: And there's a generic form of the medications at night. Do you prefer the generic if do you want to give that a try or?

Patient: Uh my insurance company would probably go to that anyways, well I would think.

Physician: It's possible. It's possible, so we'll try that and I haven't had any bad effects from that so.

### Example 2

Physician: The benefit of that drop over the other drop is it's very cheap. It's generic. Um the other option we have also works very well it doesn't have a systemic side effect to the heart and fatigue and stuff doesn't occur. But it has local side effects. It causes the lashes to grow longer. It can cause the skin around the eye to become more pigmented and it can cause the iris or the brown part of the eye to become more brown. So they both work very well I think that either one would be reasonable for you to start with. Does one sound more or less appealing than the other one to you?

Patient: Maybe the cheaper one.

Physician: Ok

Patients expressed a preference for generic glaucoma medications in 6.1% (17) of the videotape recorded glaucoma office visits. The following are some example statements made by patients that preferred generic glaucoma medications.

#### Example 1

Physician: So as far as the side effects do you have a preference for which drop you would prefer do you think?

Patient: Um well no the first one I don't even want to remember I know the second one was darkening of the eye if possible does that always happen?

Physician: It doesn't always happen. It tends to be more in people with darker skin. Uh and it is reversible. I've seen that it is reversible so that's.

Patient: The first one had the side effects of what?

Physician: It can lower your heart rate or make you feel a little tired. There are ways that we can try to avoid that, so I can teach you some maneuvers that lower that risk.

Patient: Oh I don't know. How much, which would you do?

Physician: That's a good question. I would probably go with the first I suppose because it tends to work very well, it's cheap and it's also once a day and it's usually pretty well tolerated overall. Occasionally someone will say you know I'm tired or something like that. Now you don't have any lung problems? No asthma no nothing right?

Patient: No no.

Physician: Yeah so that would be fine.

Patient: Ok I'm I know so concerned about the money as I am about the, I don't want to be tired cause I have a lot of energy. A little tired wouldn't hurt me probably but I mean I'm a very energetic go far and I do a lot of things and that if it's probably something I can see how it works for me. And if it doesn't work for me than change.

Physician: I mean I literally think either one of them is a fine first choice for you and it really is and that's why I'm telling you about both of them so if that fatigue is a concern for you the maybe we should go for the other one. Just depends on you know what your if your eyes turn brown and you'd be horrified by that then we should do the other one. It can make them more brown. If you want to think about it we can let you think about it for a little bit.

Patient: No I need to make a decision. But let me try the first one and see how tired I get.

#### Example 2

Physician: Um and so I'm going to keep you utilizing the Xalatan nightly. Now were you on the generic Xalatan?

Patient: Yeah I started three months ago on generic because I could and the other one was so expensive. I'm in the donut hole now.

Physician: Are you having any problems with the generic?

Patient: I can't notice any difference.

#### Example 3

Physician: Ok let's see so the drops have not changed still the Azopt and Latanoprost?

Patient: Mmhmm

Physician: Both generics too? Both are generics?

Patient: Mmmm I don't think the Azopt is generic. It's forty dollars.

Physician: Oh yeah. It does come in a generic though.

Patient: You think it would work? I would like to try it.

Physician: We can do that uh it looks like whatever you're taking now your name brands not working well for you.

Patient: I mean I can finish taking that bottle and then start out with maybe the generic.

In the first example, the patient explains that they would prefer to save money over the potential side effects. The physician explains that both medications would be a good option and the patient ends up choosing the generic. In the second example, a patient discusses being in the donut hole and needing inexpensive medications.

Patients expressed a preference for brand glaucoma medications in five of the videotape recorded glaucoma office visits. Patients that had a preference for brand glaucoma medications made the following statements.

#### Example 1

Physician: Good so \_\_\_\_ tells me that you're having some issues with the generic version of the Xalatan.

Patient: I am.

Physician: When I saw you in the summer time were you still on the brand name Xalatan?

Patient: I was.

Physician: Ok when did the switch occur?

Patient: Right after that visit. Cause I was expecting to receive an order from express scripts and this is what they sent me.

Physician: Ok and what's different about that drop than the?

Patient: Well it was very difficult to open first place. I need to use almost a pair of pliers to get it open initially and it seems like it's heat sealed or something.

Physician: To get the cap just off.

Patient: Very hard to open and then once I get the cap off um the drops do not flow freely like the Xalatan drops. I have to shake it and shake it to get them to come down. And when I'm holding my eye open to wait for the drop to descend my eye gets dry. It was so much easier with the Xalatan.

Physician: Does it make you any less likely to use your drop?

Patient: No but it does make my eyes burn.

#### Example 2

Patient: If it's going to cost a little bit that's alright. At least I'd rather be it's proving this other hasn't worked so

Physician: Right! I think the pressure its come up a little bit. The Combigan was keeping it at a level I was comfortable with.

Patient: Uh huh so I go back on that?

Physician: Let's go back on that. Twice a day. And if I write a three months supply do you get a break with that? Is that right? Is that how it works?

## **Summary**

In Aim 2 we investigated the prevalence and nature of patient-provider discussions of medication cost during glaucoma office visits. The majority of glaucoma office visits did not have a discussion of medication cost. This finding supports our first hypothesis, which stipulated that the majority of baseline glaucoma office visits would not have patient-provider communication regarding medication costs. Providers often did not ask if their patients had glaucoma medication cost problems. Discussions of medication cost ranged from physicians recommending patients work with a pharmacist to lower cost to patients discussing coping strategies they use to deal with medication cost problems. The most common discussions relating to medication cost were providers proposing solutions to potential cost problems, discussion of health insurance or prescription drug coverage, and discussion of brand/generic medications.

There were some significant differences between patient, medication, financial, and physician characteristics and the communication variables. For example, the majority of patients that reported cost was a problem to their ophthalmologist were non-African American. Another example was patients who were new to glaucoma medications were more likely to discuss health insurance or prescription drug insurance than prevalent glaucoma medication users. Interestingly, physicians that had practiced medicine longer were less likely to offer to write a prescription for a generic medication than physicians who had practiced for fewer years.

## CHAPTER VIII: AIM 3 RESULTS

### **Results of Aim 3 – Assess the Relationship Between Discussion of Medication Cost and Patient Adherence to Glaucoma Medications Over a 60-day Period**

*H1: Patients who have visits in which medication cost is discussed will be more adherent compared to patients who do not discuss medication cost during their visit according to MEMS.*

Figure III presents the frequency distribution for the first adherence measure, the percentage of patients that took the prescribed doses during the 60-day period following the baseline visit. As shown in the figure, the distribution of medication adherence defined as percent prescribed doses taken was skewed towards higher adherence.

**Figure III: Frequency Distribution of the Adherence Measure, Percent Prescribed Doses Taken During the 60-day Period Following the Baseline Visit**

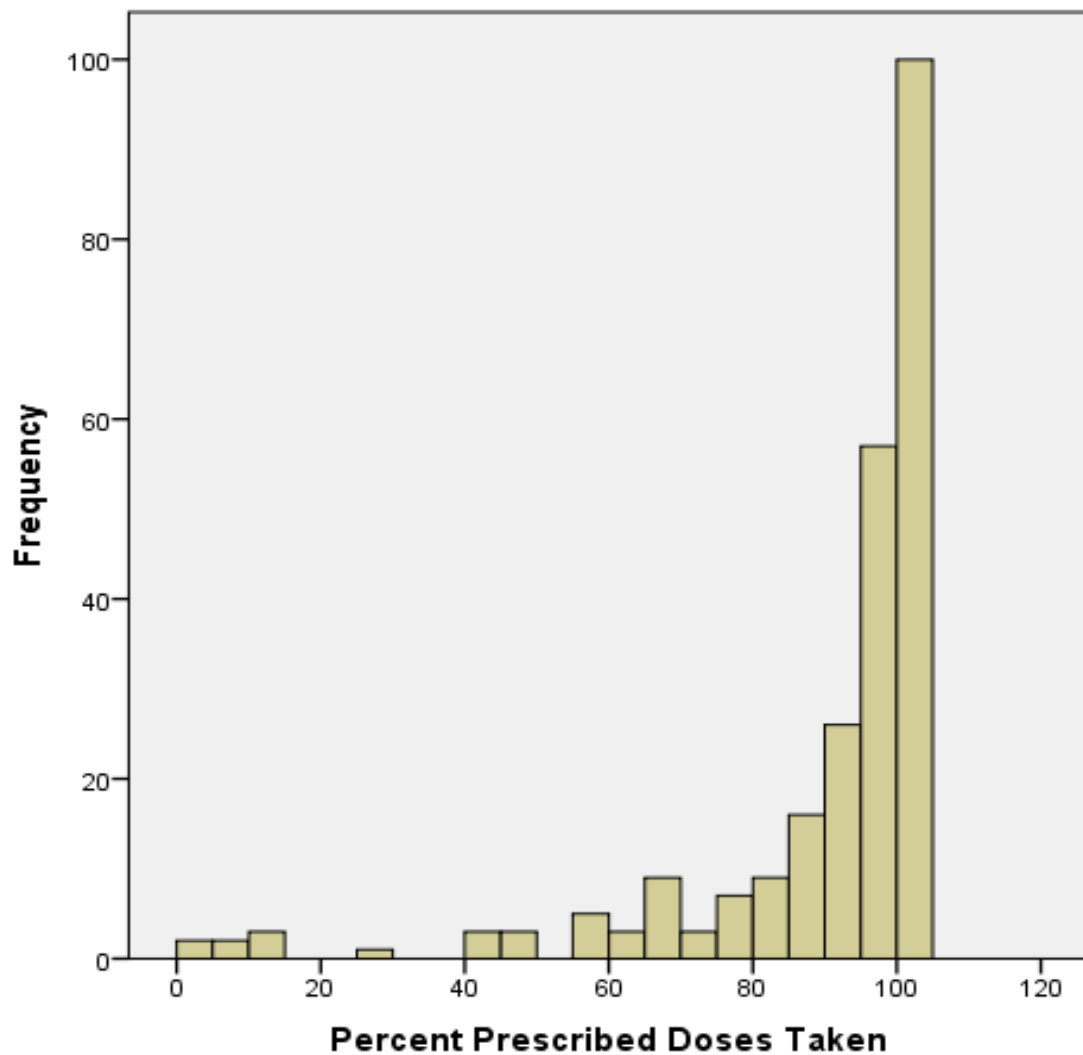


Figure IV presents the frequency distribution for the second adherence measure, the percentage of patients that took the correct number of doses each day during the 60-day period following the baseline visit. As shown in the figure, medication adherence measured by corrected number of doses each day was skewed towards higher adherence.



**Figure IV: Frequency Distribution of the Adherence Measure, Correct Number of Doses Taken Each Day During the 60-day Period Following the Baseline Visit**

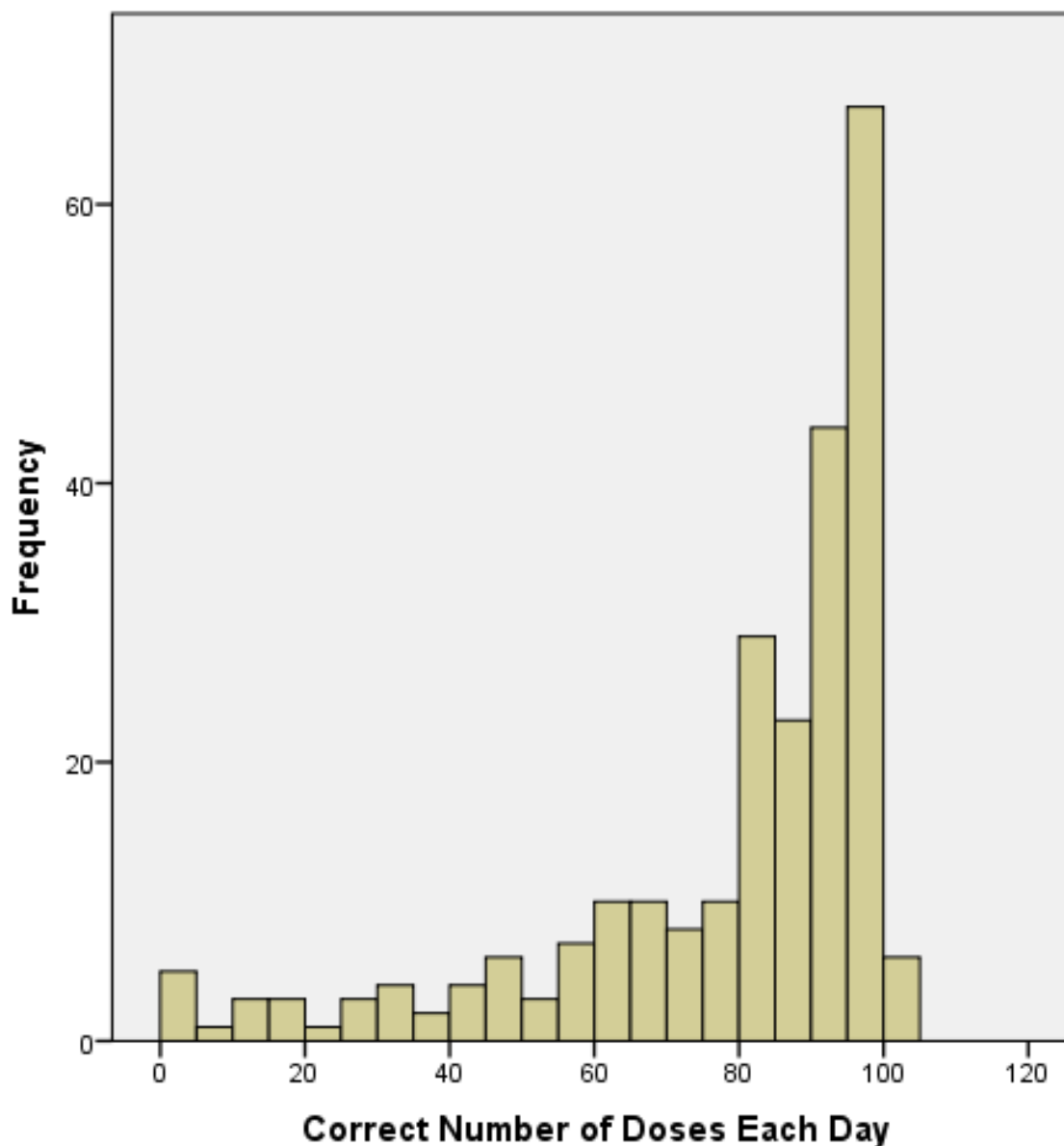
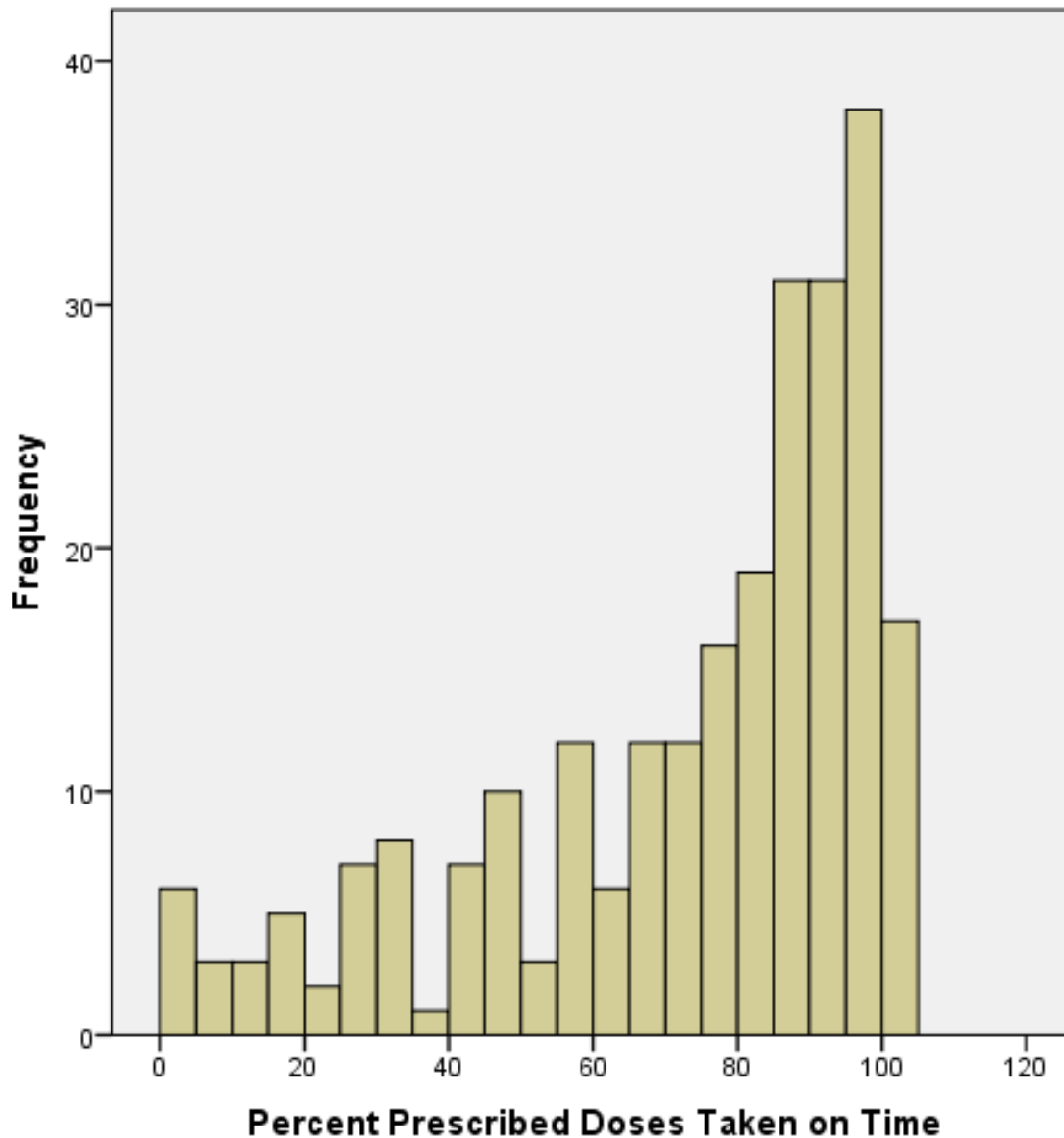


Figure V presents the frequency distribution for the third adherence measure, the percentage of patients that took the prescribed doses on time during the 60-day period following the baseline visit. As shown in the figure, medication adherence defined by percent prescribed doses taken on time was skewed towards being more adherent. Since all three measures of

medication adherence were skewed towards being highly adherent, we dichotomized adherence at 80%.

**Figure V: Frequency Distribution of the Adherence Measure, Percent Prescribed Doses Taken on Time During the 60-day Period Following the Baseline Visit**



The three measures of adherence were significantly correlated. The percentage of patients that took the prescribed doses were significantly correlated to the percentage of patients that took the correct number of doses each day and the percentage of patients that

took the prescribed doses on time during the 60-day period following the baseline visit (Pearson correlation = 0.80,  $p < 0.001$ ; Pearson correlation = 0.74,  $p < 0.001$ ). The percentage of patients that took the correct number of doses each day was significantly correlated with the percentage of patients that took the prescribed doses on time during the 60-day period following the baseline visit (Pearson correlation = 0.87,  $p < 0.001$ ).

Table 13 presents the mean adherence and percentage of patients who were 80% or more adherent to their glaucoma medications according to the following measures of adherence: a) percentage of patients that took the prescribed doses during the 60-day period following the baseline visit, b) percentage of patients that took the correct number of doses each day during the 60-day period following the baseline office visit, and c) percentage of patients that took the prescribed doses on time during the 60-day period following the baseline visit.

**Table 13: Mean Adherence and Percentage of Patients 80 Percent or More Adherent by the Different Measures of Adherence According to MEMS**

	Mean Adherence (SD)	Percentage of Patients who are 80% or more adherent
Percentage of Patients That Took the Prescribed Doses During the 60-day Period Following the Baseline Visit	89.2 (19.4)	83.9 (209)
Percentage of Patients That Took the Correct Number of Doses Each Day During the 60-day Period Following the Baseline Visit	78.4 (23.9)	67.9 (169)
Percentage of Patients That Took the Prescribed Doses on Time During the 60-day Period Following the Baseline Visit	73.2 (27.0)	54.6 (136)

Table 14 presents the percent of patients that had a cost discussion and the three medication adherence measures according to MEMS broken down by the variable, patient indicates it is hard to pay for glaucoma medications. There was not a significant difference between the extent of cost discussions and patient does or does not indicate it is hard to pay for glaucoma medications. Also, there were no significant differences between the following measures of medication adherence: a) percentage of patients that took 80% or more of their prescribed doses during the 60-day period after the baseline visit and b) percent of patients that took the correct number of doses each day during the 60-day period after the baseline visit and patient does and does not indicate it is hard to pay for glaucoma medications. There was a significant difference between patients that do and do not indicate it is hard to pay for glaucoma medications and the percentage of patients that took 80% or more of their prescribed doses on time during the 60-day period following the baseline visit (Chi-square = 6.48;  $p = 0.01$ ).

**Table 14: Percentage of Patients That Had a Cost Discussion and the Three Medication Adherence Measures According to MEMS by Patients That Do and Do not Indicate it is Hard to Pay for Glaucoma Medications (N=249)**

	Patient Indicates it is Hard to Pay Glaucoma Medications (N = 24)	Patient Does not Indicate it is Hard to Pay for Glaucoma Medications (N = 255)
Percent (N) of Patients that had a Cost Discussion	45.8 (11)	30.3 (76)
Percent (N) of Patients that took 80% of more of their prescribed doses during the 60-day period after the baseline visit	72.7 (16)	85.0 (193)
Percent (N) of Patients that took the correct number of doses each day during the 60-day period after the baseline visit	50.0 (11)	69.6 (158)

Percent (N) of Patients that took 80% or more of their prescribed doses on time during the 60-day period after the baseline visit	31.8 (7)	59.9 (136)*
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Figure VI presents a flow chart of the 24 patients that indicated it was hard to pay for their glaucoma medications. The figure shows the percent of patients that did and did not discuss medication cost during their visits and the adherence for patients that did not discuss cost. It also shows the percent adherence for each of the three measures according to MEMS broken down by patients that had a visit where a physician proposed a solution and those that did not.

**Figure VI: Flow chart of the 24 Patients that Indicated Difficulty Paying for Glaucoma Medications**

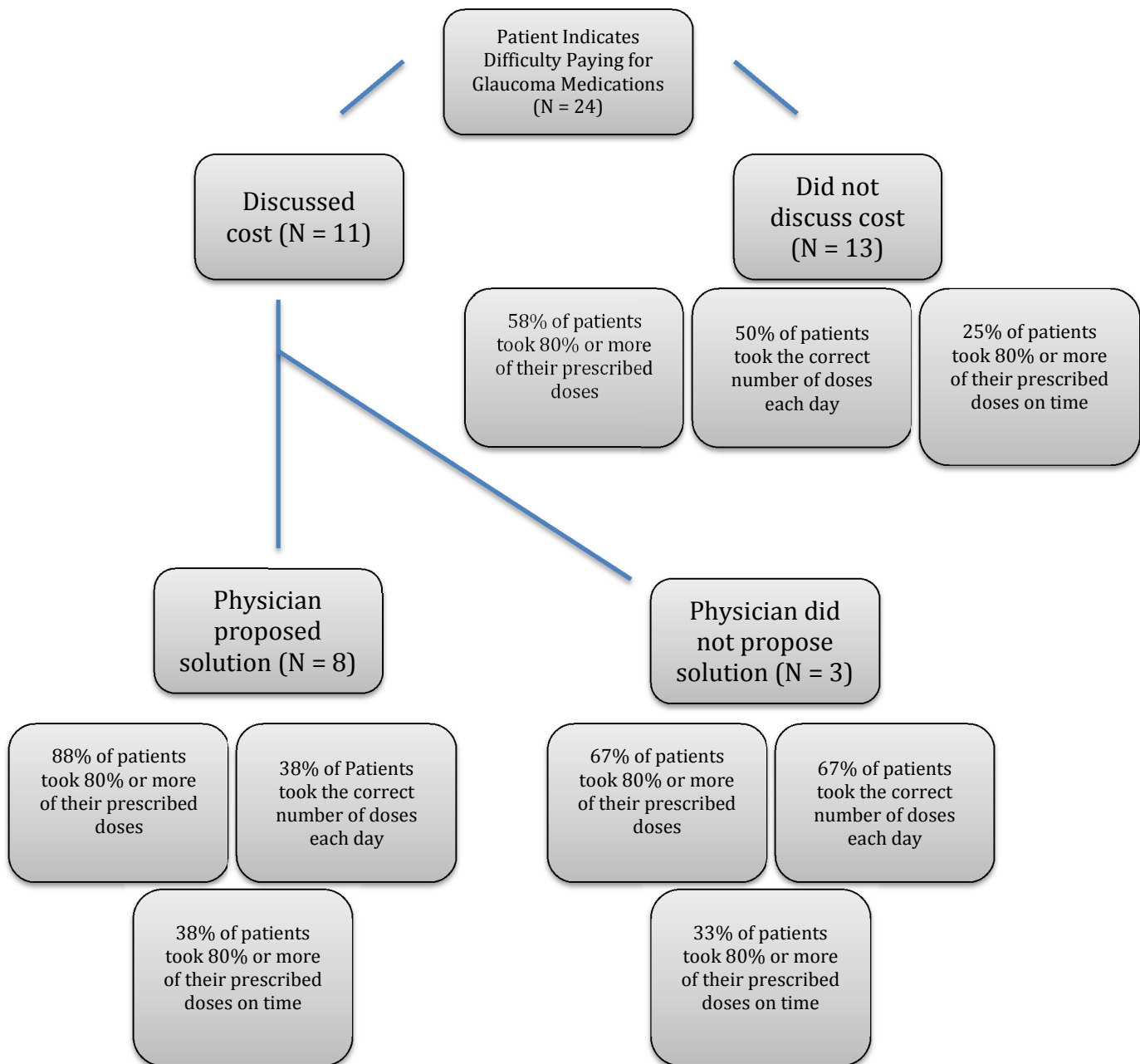


Table 15 presents the results of the logistic regression model predicting whether patients took 80 percent or more of their prescribed doses during the 60-day period after the baseline

visit as measured by electronic MEMS Caps. Two hundred and twenty-five patients successfully returned their electronic MEMS caps. Patients that returned their MEMS caps did not differ significantly from patients that did not in any of the patient, physician, medication, and financial characteristics. The Hosmer and Lemeshow test was not significant indicating adequate fit of the model (Chi-square = 5.11;  $p = 0.75$ ). The interaction term, new glaucoma medication user and medication cost discussion, was excluded from the model since it was not significant (OR = 0.44; CI = 0.06, 3.05) and did not change any of the significant predictors. Discussion of medication cost was not statistically significant in the model predicting medication adherence and therefore we reject the hypothesis that patients who have visits in which medication cost is discussed will be more adherent compared to patients who do not discuss medication cost. Patients who were new to glaucoma medications were less likely to take 80 percent or more of the prescribed number of doses during the 60-day period after the baseline visit (OR = 0.35; CI = 0.13, 0.99).

**Table 15: Logistic Regression Results Predicting Whether Patients Took 80 Percent or More of the Prescribed Doses During the 60-day Period After the Baseline Visit According to Electronic MEMS Caps (N=225)**

	Beta	S.E.	p-value	Odds Ratio	95% C.I.
Discussion of medication cost	0.67	0.46	0.14	1.96	0.80, 4.84
Patient age	0.01	0.02	0.52	1.01	0.98, 1.04
Patient gender-Female	-0.19	0.42	0.65	0.83	0.37, 1.87
Patient race-African American	-0.51	0.45	0.26	0.6	0.25, 1.45
Health literacy-less than 8th grade	-0.43	0.55	0.43	0.65	0.22, 1.91

Disease severity-mild/moderate	0.005	0.42	0.99	1.01	0.44, 2.28
Arthritis	0.61	0.47	0.19	1.84	0.74, 4.57
Physician gender-Female	-0.83	0.54	0.12	0.44	0.15, 1.25
Physician age	-0.01	0.03	0.68	0.99	0.94, 1.04
Practice type	0.44	0.46	0.34	1.55	0.63, 3.81
Number of glaucoma medications	-0.55	0.45	0.21	0.58	0.24, 1.38
New glaucoma medication users	-1	0.53	0.05	0.35	0.13, 0.99
Prescription drug coverage	-0.73	0.9	0.42	0.48	0.08, 2.83
Hard to pay for prescriptions	-0.8	0.67	0.23	0.45	0.12, 1.66

Table 16 presents the results of the logistic regression model predicting whether patients took the correct number of doses each day during the 60-day period after the baseline visit measured using electronic MEMS Caps. The Hosmer and Lemeshow test was not significant indicating adequate fit of the model (Chi-square = 6.36; p = 0.61). The interaction term, new glaucoma medication user and medication cost discussion, was excluded from the model since it was not significant and did not change any of the significant predictors (OR = 2.66; CI = 0.55, 12.86). Discussion of medication cost was not statistically significant in the model predicting medication adherence. Patients seeing a female physician were less likely to take the correct number of doses each day during the 60-day period after the baseline visit (OR = 0.34; CI = 0.15, 0.79).



**Table 16: Logistic Regression Results Predicting Whether Patients Took the Correct Number of Doses Each Day During the 60-day Period After the Baseline Visit According to Electronic MEMS Caps (N = 225)**

	Beta	S.E.	p-value	Odds ratio	95% C.I.
Discussion of medication cost	0.32	0.33	0.34	1.38	0.72, 2.65
Patient age	-0.002	0.01	0.9	1	0.97, 1.02
Patient gender-Female	0.29	0.32	0.37	1.34	0.71, 2.52
Patient race-African American	-0.46	0.36	1.99	0.63	0.31, 1.28
Health literacy- less than 8th grade	-0.03	0.45	0.96	0.98	0.4, 2.38
Disease severity-mild/moderate	-0.54	0.32	0.1	0.59	0.31, 1.1
Arthritis	-0.12	0.33	0.72	0.89	0.46, 1.7
Physician gender-Female	-1.08	0.43	0.01	0.34	0.15, 0.79
Physician age	-0.36	0.02	0.05	0.97	0.93, 1.00
Practice type	0.14	0.35	0.68	1.16	0.58, 2.31
Number of glaucoma medications	-0.56	0.34	0.1	0.57	0.29, 1.12
New glaucoma medication users	-0.46	0.43	0.28	0.63	0.28, 1.45
Prescription drug coverage	-0.18	0.66	0.78	0.83	0.23, 3.05
Hard to pay for prescriptions	-0.84	0.56	0.13	0.43	0.15, 1.29

Table 17 presents the results of the logistic regression model predicting whether patients took 80 percent or more of their prescribed doses on time during the 60-day period after the baseline visit measured using electronic MEMS caps. The Hosmer and Lemeshow test was not significant indicating adequate fit of the model (Chi-square = 4.75;  $p = 0.78$ ). The interaction term, new glaucoma medication user and medication cost discussion, was excluded from the model since it was not significant (OR = 4.55; CI = 0.90, 23.02) and did not change any of the significant predictors. Discussion of medication cost was not statistically related to medication adherence. Patients seeing a female physician were less likely to take 80 percent or more of their prescribed doses on time during the 60-day period after the baseline visit (OR = 0.39; CI = 0.17, 0.89). Also, patients who reported difficulty paying for their prescription medications were significantly less likely to take 80 percent or more of their prescribed doses on time during the 60-day period after the baseline visit (OR = 28; CI = 0.09, 0.89).

**Table 17: Logistic Regression Results Predicting Whether Patients Took 80 Percent or More of Their Prescribed Doses on Time During the 60-day Period After the Baseline Visit According to Electronic MEMS Caps (N = 225)**

	Beta	S.E.	p-value	Odds ratio	95% C.I.
Discussion of Medication Cost	0.22	0.32	0.49	1.25	0.67, 2.32
Patient age	0.02	0.01	0.2	1.02	0.99, 1.04
Patient gender-Female	0.22	0.31	0.47	1.25	0.68, 2.29
Patient race-African American	-0.24	0.35	0.48	0.79	0.4, 1.54
Health literacy- less than 8th grade	-0.13	0.44	0.48	0.73	0.31, 1.73
Disease severity-mild/moderate	-0.26	0.31	0.41	0.77	0.42, 1.43

Arthritis	< 0.001	0.32	1.00	1.00	0.53, 1.88
Physician gender-Female	-0.95	0.42	0.03	0.39	0.17, 0.89
Physician age	-0.02	0.02	0.22	0.98	0.95, 1.01
Practice type	0.47	0.33	0.16	1.60	0.83, 3.07
Number of glaucoma medications	-0.57	0.33	0.09	0.57	0.30, 1.08
New glaucoma medication users	0.02	0.42	0.96	1.02	0.45, 2.30
Prescription drug coverage	-0.94	0.69	0.18	0.39	0.10, 1.52
Hard to pay for prescriptions	-1.26	0.59	0.03	0.28	0.09, 0.89

As presented in Chapter VII, providers discussed solutions to potential cost problems in 50 of the glaucoma office visits, which is 17.9% (50/275) of the total office visits and 58.1% (50/87) of the visits where medication cost was discussed. Twelve out of fifteen physicians proposed a solution to a potential cost problem to at least one of their patients. Out of the twelve physicians that proposed a solution, only two physicians proposed a solution to more than 25% of their patients.

Figure VII presents the percentage of patients who took 80% or more of the prescribed doses during the 60-day period following the baseline visit stratified by physician by the percentage of patients given a solution to a potential cost problem stratified by physician. The scatter plot shows that there is no noticeable relationship between physicians providing solutions to cost problems and patients that took 80% or more of the prescribed doses during the 60-day period after the baseline visit.

**Figure VII: Percentage of Patient Who Took 80% or More of the Prescribed Doses During the 60-day Period After the Baseline Visit by Percentage of Patients Given a Solution to a Potential Cost Problem Stratified by the Physician**

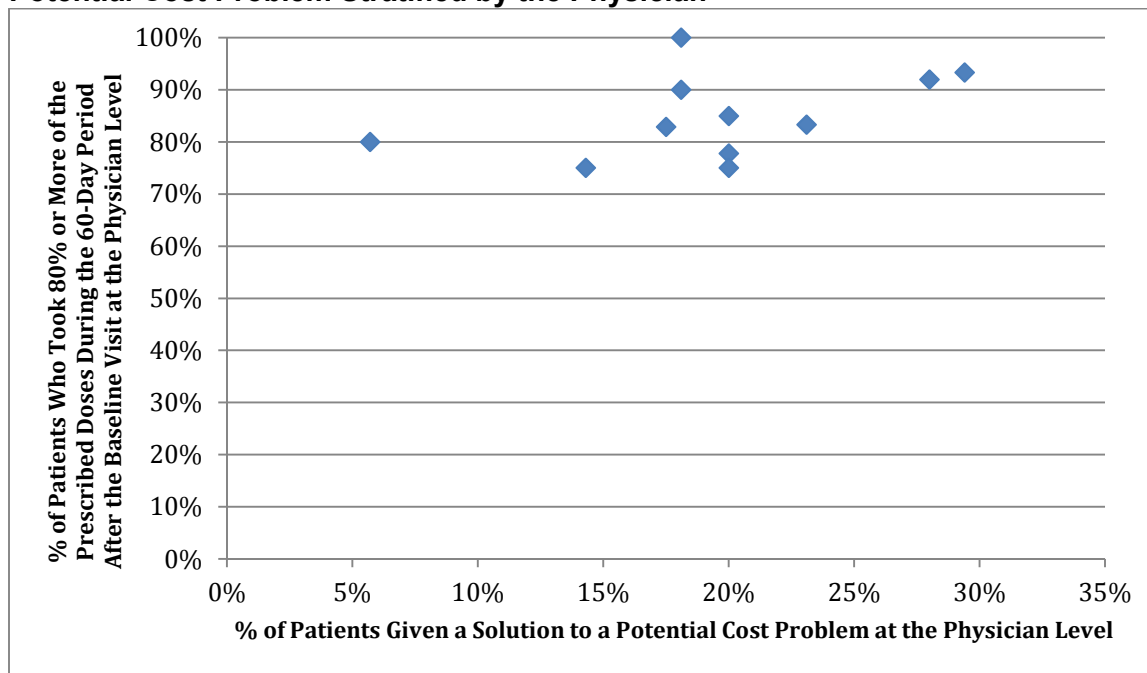


Figure VIII presents the percentage of patients who took the correct number of doses each day during the 60-day period following the baseline visit stratified by the physician by the percentage of patients given a solution to a potential cost problem stratified by the physician. Again, the scatter plot reveals that there is no noticeable relationship between physicians providing solutions to cost problems and the second measure of adherence.

**Figure VIII: Percentage of Patients That Took the Correct Number of Doses Each Day During the 60-day Period After the Baseline Visit by Percentage of Patients Given a Solution to a Potential Cost Problem Stratified by the Physician**

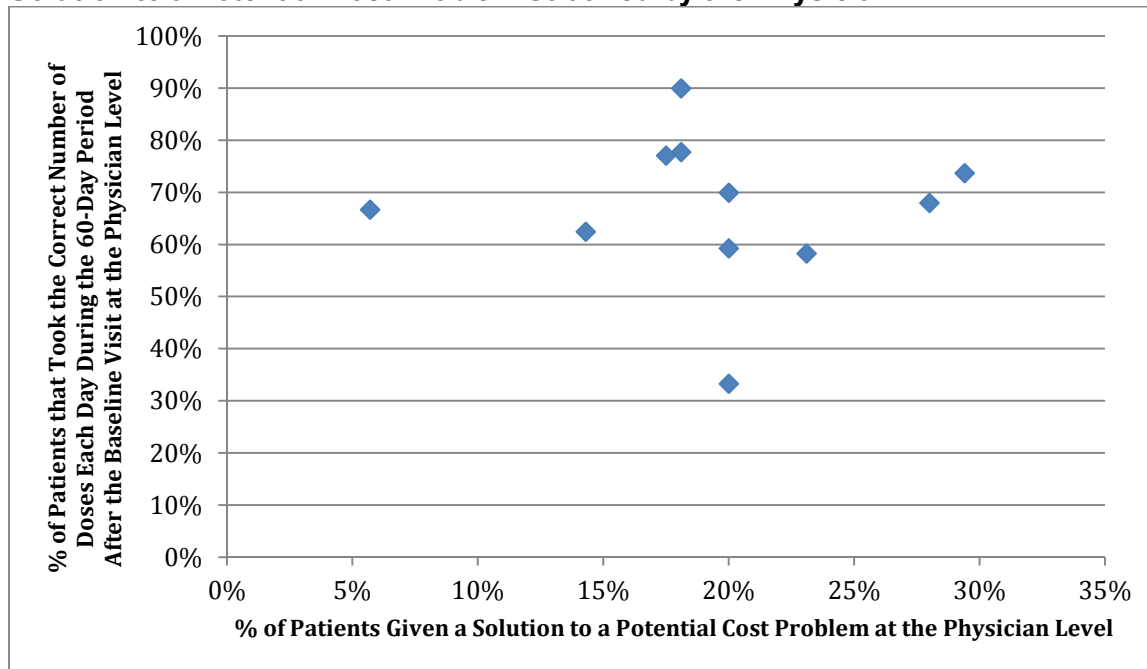
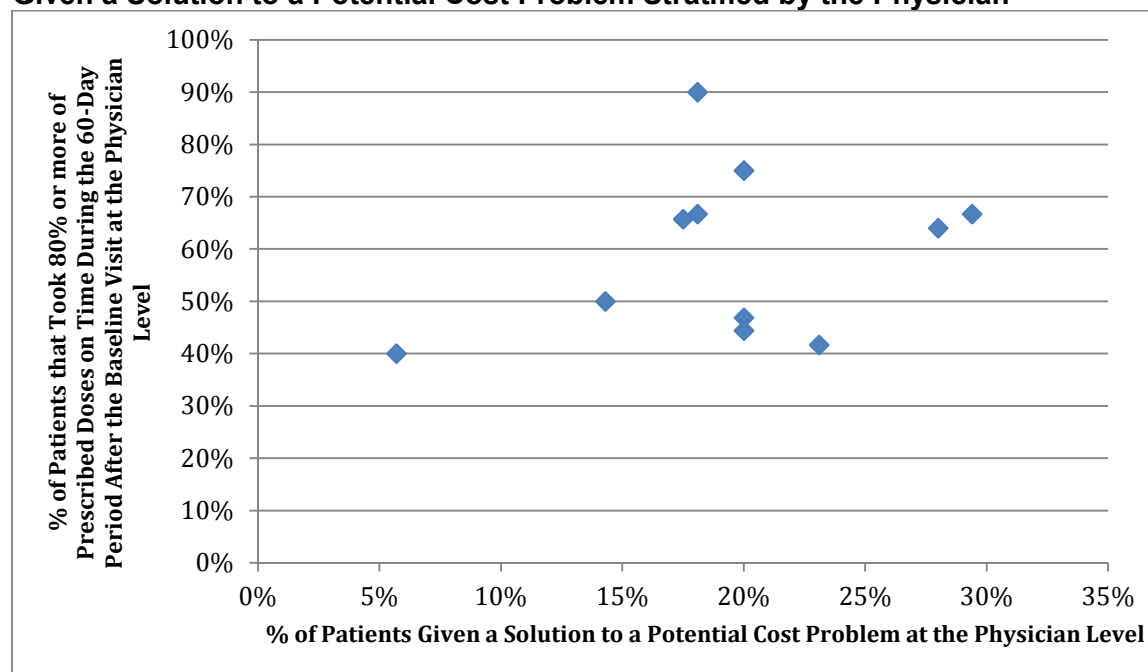


Figure IX presents the percentage of patients who took 80% or more of the prescribed doses on time during the 60-day period following the baseline visit stratified by the physician by the percentage of patients given a solution to a potential cost problem stratified by the physician. Again, there is no distinct relationship shown between physicians providing solutions to cost problems and the third measure of adherence.

**Figure IX: Percentage of Patients Who Took 80% or More of the Prescribed Doses on Time During the 60-day Period Following the Baseline Visit by Percentage of Patients Given a Solution to a Potential Cost Problem Stratified by the Physician**



## Summary

Discussing medication costs was not a significant predictor of medication adherence over the 60 days following the baseline visit. This finding does not support our hypothesis that stated, patients who have visits in which medication cost is discussed will be more adherent compared to patients who do not discuss medication cost during their visit according to MEMS.

Patients who were new to glaucoma medications were less likely to take 80 percent or more of the prescribed doses during the 60-day period after the baseline visit (OR = 0.35; CI = 0.13, 0.99). Patients seeing a female physician were less likely to take the correct number of doses each day (OR = 0.34; CI = 0.15, 0.79) and less likely to take 80 percent or more of their prescribed doses on time during the 60-day period after the baseline visit (OR = 0.39; CI = 0.17,

0.89). Also, patients who reported difficulty paying for their prescription medications were significantly less likely to take 80% or more of their prescribed doses on time (OR = 0.28; CI = 0.09, 0.89).

The majority of physicians (80%) proposed a solution to a potential cost problem to at least one of their patients. However, of these physicians, most presented a solution to less than 25% of their patients. Proposing a solution to a potential cost problem was not associated with any of the medication adherence measures.

## **CHAPTER VI: DISCUSSION**

The purpose of this dissertation was to improve our understanding of communication about medication cost between ophthalmologists and glaucoma patients and its effects on medication adherence. This dissertation helps address gaps in the literature by improving our understanding of the extent and nature of glaucoma patient-provider communication regarding medication cost. This dissertation also identifies patient and physician characteristics that are associated with a discussion of medication cost. While the glaucoma literature often cites medication cost as a barrier to medication adherence, this was one of the first studies to examine the relationship between medication cost discussions and glaucoma medication adherence.<sup>7,8,12</sup> This study utilized both qualitative and quantitative methods to examine medication cost communication. The following sections summarize the findings and discuss the implications of the study results, discuss the limitations and strengths of the study, and present potential directions for future research.

### **Summary of Findings**

The proposed theoretical framework for this dissertation was adapted from Eisenberg's Sociologic Influences on Decision-Making and Piette's Chronically Ill Patient's Response to Cost Pressures (Figure II).<sup>88,89</sup> Five main areas were identified as contributing to communication between patients and ophthalmologists regarding medication cost: 1) patient characteristics, 2) ophthalmologist characteristics, 3) ophthalmologist practice type, 4) medication characteristics, and 5) financial pressures. The following sections present our findings as it relates to the proposed theoretical framework.



## Patient Characteristics

The proposed theoretical model presented patient demographics as influencing two areas: 1) patient-physician communication concerning medication cost and 2) medication adherence. Our study results indicated that patient demographics were not associated with medication cost communication. Prior research found ethnic minority patients to be less verbally expressive and less assertive during medical encounters which led us to hypothesize that African American patients would be less likely to discuss medication cost than non-African American patients.<sup>24,125</sup> However, our study results indicate no significant differences between patient race and medication cost discussion. It is important to keep in mind that although our sample was racially diverse, the majority of participants (86%) had higher reading levels according to the REALM (9<sup>th</sup> grade and above). Since our sample had significantly higher reading levels than the general population, these results may not be generalizable.

Patients communicated about medication cost problems in different ways. Some patients talked to their physician about changing their medication regimen because of a cost problem. Others discussed coping strategies used in the past to deal with cost problems. Prior work has found that many patients do not communicate about medication costs with their physician.<sup>25</sup> Patients may feel uncomfortable bringing up cost concerns or feel that their ophthalmologists are unable to help them reduce their medication costs. Ophthalmologists may need to prompt these patients in order to begin a productive dialogue regarding their medication cost concerns. A simple statement such as “Any problems with how much your eye drops for glaucoma cost?” may help patients feel comfortable talking to their ophthalmologist about medication costs.

Patient demographics were not significantly associated with electronically-measured medication adherence in the 60 days following the baseline visit. Prior literature has found that

older patients were less likely to forgo medications when facing cost pressures compared to younger patients.<sup>86</sup> However, patient age was not significantly associated with medication adherence in the current study. This may be influenced by the number of patients in our sample dealing with medication cost problems. Only 24 (8.6%) patients indicated it was hard to pay for their glaucoma medications. Future studies may want to examine the influence of patient age on medication adherence by restricting enrollment to glaucoma patients who report cost-related nonadherence. Prior work has found that patients with lower reading levels to be less adherent to glaucoma medications.<sup>86,139</sup> We did not find that patient reading level was significantly associated with medication adherence. However, again it is important to recognize the majority of our patient sample (86%) read at a higher grade level (9<sup>th</sup> grade and above).

#### Ophthalmologist Characteristics

The proposed theoretical framework identified ophthalmologist demographics as influencing communication about medication costs. However, our results indicate no statistically significant differences in physician characteristics and discussion of medication cost. Prior research has found links between the extent of communication and physician gender.<sup>128</sup> Female physicians have been found to be more likely to report an empathic communication style, allowing them to identify with patients and enhance the discussion of medication cost.<sup>128</sup> However, we did not find physician gender to influence medication cost discussions. The female physicians in our sample were younger compared to the male physicians. The interaction between gender and age may have influenced our results. Prior research has found that recent graduates were less likely to have a directive approach to care, which enables a more interactive discussion.<sup>131</sup> We did not find an association between years practicing and extent of medication cost communication. Future work could include a question on the

physician demographics questionnaire evaluating their approach to care (directive versus interactive) in order to evaluate the influence of approach to care on medication cost communication. Prior work has also found links between the extent of communication and physician race.<sup>129</sup> We were unable to detect differences in physician race and the extent of communication. However, this may have been due to our physician sample, which was predominately White (93%). Future studies may want to enroll a racially diverse physician sample in order to examine the influence of physician race on medication cost communication.

Providers communicated about medication costs in different ways with their patients. The most prevalent cost-related communication involved discussing solutions to potential cost problems. Physicians proposed a solution to a potential cost problem in 50 office visits while patients indicated cost was a problem in only 13 office visits. The discrepancy between patients reporting cost problems and physicians proposing solutions indicates that physicians are not evaluating cost problems before proposing solutions. Physicians may want to consider evaluating cost problems first so that they can individualize their cost solutions.

### Ophthalmologist Practice Type

Ophthalmologist practice type was incorporated into the theoretical model as influencing patient-physician communication concerning medication cost. Prior research has found that discussions of medication cost occurred more with patients seen in community practices compared to academic medical centers.<sup>62</sup> However it is important to note that this study took place in the Chicago metropolitan area, with 3 large academic general internal medicine practices and 9 community-based affiliates of these practices. We did not find an association between ophthalmologist practice type and medication cost communication. Our study sample was comprised of ophthalmologists practicing at 4 academic medical centers and 2 private

practices across the country. The patient population may influence the results. For example, in the Chicago metropolitan area physicians in community practices may be instructed to discuss medication costs with their patients because a significant portion of their patient population has difficulty affording medications.

Our study found that physicians in private practices were significantly more likely to discuss providing samples compared to physicians practicing in academic medical centers. This finding may be related to prescribing patterns between academic medical centers and private practices. Physicians in private practices may distribute more samples because they prescribe more brand medications compared to physicians in academic medical centers. Also, many academic medical centers do not allow samples. An alternative explanation is physicians in private practices are using samples to alleviate the cost burden associated with glaucoma medications. The benefits and pitfalls of sample use have been debated over the years.<sup>140,141</sup> Some argue that samples improve patient access to medications and familiarize physicians with new medications. Others have argued that samples emphasize the use of more expensive medications over effective older medications.<sup>140</sup> We were unable to evaluate prescribing patterns or physician reasons for using samples in our study. However, future work should investigate the use of samples in different practice settings and the effects on medication cost and adherence.

### Medication Characteristics

Our theoretical model posited that medication characteristics including number of glaucoma medications, whether the patient was a new or prevalent glaucoma medication user, and type (brand vs. generic) would influence patient-provider communication about medication cost as well as patient medication adherence. We did not find a significant association between the number of glaucoma medications and a discussion of medication cost. We did find new

glaucoma medication users were significantly more likely to discuss medication cost compared to prevalent medication users. One possible reason may be that physicians present medication costs to new patients to help them choose between different glaucoma medications. In our qualitative analysis of glaucoma office visits we found that some physicians discussed medications that were available as generics to help cost sensitive patients make an informed decision when choosing a medication. Another explanation is that patients already taking glaucoma medications discussed cost during a prior office visit, which was not captured by our study. Future work should limit enrollment to patients newly prescribed glaucoma medications in order to investigate this relationship in a more rigorous manor.

Physicians were more likely to propose a solution to a potential cost problem to patients who were taking one glaucoma medication compared to patients taking two or more glaucoma medications. However, new glaucoma medication users were more likely to take one glaucoma medication and we found that physicians were significantly more likely to propose a solution to potential cost problem in new glaucoma medication users. Therefore, the association we found between physicians proposing solutions and number of glaucoma medications may have been influenced by whether the patient was a new glaucoma medication users. Another possible explanation is that patients taking more than one glaucoma medication have greater glaucoma severity and their physicians may prioritize the discussion of medication costs differently than patients with less severe glaucoma. For example, physicians may need to focus more time with patients who have more severe glaucoma on the importance of proper eye drop technique in order to prevent glaucoma from advancing further.

Brand and generic medications were discussed in nineteen percent of glaucoma office visits. Physicians were significantly more likely to initiate a discussion of brand and generic medications compared to patients. However, physicians rarely explained the difference between brand and generic medications. In two visits, patients expressed confusion regarding

the difference between brand and generic medications. Physicians may want to evaluate patient understanding of brand/generic medications before they use these terms. A simple question such as “Are you aware of the differences between brand and generic medications?” may improve patient understanding. Interestingly, all of the visits where a physician offered to write a prescription for a generic medication as an alternative to a brand medication took place in an academic medical center. One possible explanation is that physicians in private practices may tend to prescribe newer brand medications while physicians in academic medical centers may prefer to prescribe generics.

Patients expressed preferences for generic and brand medications in eight percent of glaucoma office visits. These preferences may be due to prior experience, desire to save money, and misconceptions regarding generic medications. It is important for physicians to take the time to evaluate the reasons behind brand or generic preferences so that they may prescribe the most effective and affordable medication.

Prior literature has found an association between medication characteristics and glaucoma medication adherence.<sup>75,132</sup> Patients taking more glaucoma medications have been found to have lower levels of adherence.<sup>75</sup> However, we did not find a relationship between the number of glaucoma medications and adherence. Prior work has also found that patients newly initiated on glaucoma medications are less adherent compared to patients already taking glaucoma medications.<sup>132</sup> In our study patients who were new to glaucoma medications were less likely to take 80 percent or more of the prescribed number of doses during the 60-day period after the baseline visit. Physicians should recognize this and emphasize the importance of glaucoma medication adherence in preventing progression of the disease. Patients should communicate concerns to their physician during the first glaucoma visit so that physicians can attempt to alleviate medication adherence barriers. Interventions that empower patients to

effectively communicate their concerns are needed to improve medication adherence for patients new to glaucoma medications.

## Financial Pressures

The proposed theoretical model shows financial pressures as influencing medication adherence but not cost communication.<sup>89</sup> However, we found that prescription drug insurance status was significantly associated with discussion of medication cost. Patients were more likely to discuss medication cost if they had no prescription drug coverage compared to patients with partial or generous coverage. Patients without prescription drug coverage may be more concerned with their drug costs than people with prescription drug coverage. These patients may feel a greater financial burden with medications and express these concerns to their ophthalmologist. In order for physicians to assist patients without prescription drug coverage, they must be aware of a patient's insurance status. Our qualitative analysis revealed that health insurance and prescription drug coverage were discussed in only 15% of office visits. Making insurance information readily available to physicians during office visits will help them to choose effective and affordable medications and provide assistance to patients in need.

Prior research has found an association between lack of health insurance prescription coverage and medication nonadherence.<sup>7,20</sup> Therefore, physicians should work to engage patients without prescription coverage since they are at a higher risk of nonadherence. Asking a simple question like, "Do you have any problems paying for your glaucoma medications?" may start a critical dialogue that reveals medication nonadherence due to cost problems. This could help patients and physicians brainstorm solutions together on lowering medication cost such as enrolling in drug assistance programs.

## Communication between Patient & Ophthalmologist Regarding Medication Cost

Patient-provider communication concerning medication cost was central to our proposed theoretical model. In our qualitative analysis of glaucoma office visits we found that the majority of visits do not contain a discussion of medication cost. This finding is consistent with the work of other researchers looking at the extent of medication cost communication in other chronic diseases.<sup>63</sup>

According to the American Academy of Ophthalmology's Preferred Practice Patterns ophthalmologists should work collaboratively with patients and provide care that is cost effective without compromising accepted standards of quality.<sup>27</sup> The guidelines specifically mention adjusting glaucoma therapy if the patient does not adhere due to cost. Yet, ophthalmologists rarely evaluate medication cost problems with simple questions such as "Are you having any problems affording your glaucoma medications?" or "Has the cost of your glaucoma medications cost been an issue for you?"

Ophthalmologists rather than patients were more likely to initiate a discussion of medication cost compared to patients. This finding indicates that although patients may be experiencing cost problems, often they do not bring it up to their physician. A recent study by Patel and Wheeler had similar findings when they investigated the extent of cost communication in asthma patients.<sup>12</sup> Although seventy-two percent of the sample reported a preference to discuss cost with their health care provider, only thirty-nine percent reported actually having a conversation with their physician about cost.<sup>12</sup> When discussing options for glaucoma medications, physicians may want to include a cost comparison since patients may want to weigh their options. Statements such as "Medication A is available as a cheaper generic while Medication B is not" or "What type of prescription insurance do you have because Medication A has a high out of pocket cost for many of my patients" could help patients when choosing



between two glaucoma medications. It is also important to improve patient initiation of medication cost discussions. A simple handout provided to patients before their office visit could suggest ways to discuss medication cost with their physician. The handout could also list facts regarding ways to lower medication cost so that patients feel educated and prepared to discuss medication cost with their physician.

Our study found that patients who were newly prescribed glaucoma medications were significantly more likely to have an office visit where medication cost was discussed compared to patients already on glaucoma medications. One explanation for our findings is that the prevalent glaucoma medication users may have discussed cost during a prior visit. Another possible reason for this finding is patients are unaware that physicians may be able to help reduce the cost burden of their glaucoma medications. Therefore, patients do not initiate a medication cost discussion during follow-up visits. Prior research has found that patients who report cost related nonadherence often do not talk to their physician about it.<sup>25</sup> Continuing the dialogue past the initial glaucoma office visit is important for physicians and patients in order to evaluate cost barriers leading to nonadherence. Physicians could use these open-ended questions to engage their patients at follow-up visits: “How much did you pay for your glaucoma medications the last time you picked them up?” or “Did you have any problems affording your glaucoma medications?” or “Is cost a problem? There may be a less expensive alternative for your glaucoma medications if cost is a problem for you”.

## Medication Adherence

The proposed theoretical framework suggested patient-provider communication concerning medication cost influenced medication adherence. However, our study results did not find any significant relationships between a medication cost discussion and the three

electronic measures of medication adherence. We may have not found a relationship between cost communication and medication adherence because of characteristics of our patient sample. During an interview, only 8 percent of the patient sample indicated difficulty when paying for their prescription medications. Therefore, the patient sample as a whole may not have been representative of patients struggling with medication cost problems. Future work should evaluate medication cost problems prior to enrollment in the study. The way that we chose to define medication adherence may have had an influence on our findings. If we had looked at gaps in therapy or another definition of adherence we may have had different findings. Another possible reason for our findings may have been the way we evaluated a medication cost discussion: a) medication cost discussed during the visit and b) physician proposes a solution to a potential cost problem. Discussing medication cost may not have been sufficient to alter glaucoma medication adherence. A physician proposing a solution to a potential cost problem may be more likely to reduce a cost-related barrier and improve medication adherence. However, we found that only thirteen patients indicated cost was a problem while physicians proposed solutions in fifty office visits. Perhaps we did not find a relationship between physicians proposing a solution and medication adherence because physicians were not tailoring their solutions to individuals with cost problems. In order for physicians to reduce cost-related barriers they must have an understanding of each patient's unique concerns and problems. Asking a general question such as "Do you have problems paying for your glaucoma medications?" would help to identify patients that need assistance. If a patient indicates difficulty paying for their medications the physician could then evaluate what specific barriers the patients faces and then suggest ways to alleviate this barrier.

The first measure of medication adherence revealed that patients newly prescribed glaucoma medications were less likely to take 80 percent or more of the prescribed number of doses during the 60 days following the baseline office visit compared to patients already taking

glaucoma medications. There are a number of explanations for this finding. First, patients who are new to glaucoma medications may experience side effects that prevent them from continuing treatment. Another explanation is patients may not understand their dosing regimen or the importance of medication adherence. As we found in our qualitative examination of the transcripts, patients may also be taking less medication to save money. For example one patient stated, “Well I quit using the Xalatan because I didn’t have any insurance or anything to help me pay for it”. Therefore, it is important for physicians to take the time to explain the importance of medication adherence and alleviate potential barriers, including cost, before patients leave their initial glaucoma office visit. Prior literature has shown that patients want their physician to discuss cost and consider cost when choosing medications.<sup>24</sup>

The second measure of medication adherence revealed that patients seeing a female physician were less likely to take the correct number of doses each day during the 60-day period after the baseline visit. The third measure of medication adherence found that patients seeing a female physician were less likely to take 80 percent or more of their prescribed doses on time during the 60-day period after the baseline visit. Prior literature has not found an association between physician gender and glaucoma medication adherence but has found gender differences in patient-provider communication due to communication styles, perceptions of person they are speaking to, and the way they accommodate each other’s behavior during the interaction.<sup>128</sup> Future studies should examine if gender differences may be influencing patient medication adherence. Physician gender was not significantly correlated with any of the patient demographic characteristics that may explain the lower levels of adherence. Therefore, there may be an underlying mediator such as patient communication style or physician communication style that explains why patients seeing female physicians were less likely to be adherent. The results could also be explained by Type 1 error.

Patients who reported difficulty paying for their prescription medications were significantly less likely to take 80% or more of their prescribed doses on schedule. This finding is consistent with the literature that has identified cost as a barrier to medication adherence.<sup>8,12</sup> Therefore, physicians should evaluate medication cost problems and then prioritize cost discussions for these patients. Research has found that having a discussion about drug cost was significantly associated with switching to a lower priced drug.<sup>25</sup> Physicians could also educate patients on available medication assistance programs and seek their input to make shared decisions about medication regimen changes.

The majority of physicians proposed at least one of their patients a solution to a potential cost problem during their visit. However, only two physicians proposed solutions to more than 25% of their patients. These results indicate that physicians are selective with whom they discuss medication cost solutions with. Interestingly, we found that the majority of patients whom physicians proposed potential cost solutions to did not indicate cost was a problem during the office visit. Therefore, physicians may want to evaluate medication cost concerns before proposing solutions to patients. Then the physician can tailor the solutions to an individual unique cost concerns. In order to tailor a solution, physicians need to engage patients so they share their unique medication cost barriers.

### **Theoretical Framework Summary**

In summary, the proposed theoretical framework was useful in identifying some important areas relating to medication cost communication and medication adherence. Patient and ophthalmologist characteristics were not significantly associated with medication cost discussion in our study. A medication characteristic, specifically status of glaucoma medication use (new vs. established user) was a significant predictor of cost discussions. New glaucoma medication users tended to be significantly more likely to discuss medication cost compared to

prevalent medication users. The theoretical model did not posit that financial pressures would influence medication cost discussions. However, we found that financial pressures such as lack of prescription drug coverage was associated with medication cost discussions. Patients were more likely to discuss medication cost if they had no prescription drug coverage compared to patients with partial or generous coverage. Additional studies should be done to see if this finding is replicated in other populations.

Our study did not show an association between medication cost discussion and medication adherence. However, it is important to note that the sample was not limited to patients who reported nonadherence or medication cost problems. Future work utilizing this theoretical framework may want to consider limiting enrollment to patients who express nonadherence and problems with medication cost in order to investigate the role of patient-physician communication concerning cost and glaucoma medication adherence.

Future work investigating patient-provider communication concerning cost in the glaucoma patients should consider using the proposed conceptual framework. However, investigators should recognize that our study results often did not align with the framework. For example, we found a relationship between prescription drug coverage and patient-physician communication regarding medication cost. Before performing a similar study, a literature review should be conducted to identify other conceptual frameworks that may help to explain the complex relationship between patient-provider communication of cost and medication adherence.

## **Implications**

Patient-provider communication regarding medication cost could encompass a variety of discussions between glaucoma patients and ophthalmologists. The following section outlines

the implications that medication cost communication can have on patient care, physician practices, and pharmacists.

Medication cost communication between providers and patients may offer a number of benefits for patient care. First, it may assist providers and patients in deciding on an appropriate treatment plan and enhance shared decision-making. Often patients are given a number of options for treating their glaucoma including multiple medications and surgery.<sup>5</sup> Presenting the costs of these medications along with side effects will provide patients with vital information to make an informed decision.

Second, having a cost-related discussion may initiate a dialogue between patients and providers regarding barriers to medication adherence and persistence. Although we didn't find an association between medication cost and adherence, prior studies have found medication cost to be a commonly cited barrier to medication adherence.<sup>7,8,12</sup> Our study found that the majority of glaucoma office visits did not have any discussion related to medication cost. In order for physicians to propose solutions to patients with medication cost problems, they must have an idea of the specific challenges relevant to each patient. Discussing medication cost opens a dialogue where specific cost related challenges could be assessed. Physicians could evaluate medication cost problems by asking simple questions such as "Are you having problems affording your glaucoma medications?" or "Do you have any concerns about your glaucoma medication costs?"

Third, having a cost-related discussion may give physicians an opportunity to educate their patients regarding the importance of medications and different options available to them (e.g. generic medications, laser therapy). For example, physicians can provide information on available generic medications and why these medications may be beneficial.

Fourth, it provides an opportunity for physicians to recognize the out-of-pocket costs of the medications they are prescribing. Physicians should be treating the "whole patient" which

includes financial barriers. When reviewing the glaucoma office transcripts for this study it was evident that physicians were sometimes unaware of the out-of-pocket costs of the medications they were prescribing. Evaluating a patient's out-of-pocket medication cost during glaucoma office visits will educate physicians and possibly influence their prescribing behavior. There is no benefit to prescribing medication a patient cannot afford. Physicians could ask patients questions such as "How much did your glaucoma medications cost you last month?" or "Did your insurance cover your glaucoma medications?"

The results of this study may also have implications for pharmacists. Our research shows that physicians rarely encouraged patients to work with their pharmacist to reduce medication cost. Collaborative care models have been successfully used in the past in other disease states including asthma and hypertension.<sup>142,143</sup> To the author's knowledge, there are no studies on collaborative care models with ophthalmologists and pharmacists. This could be an important area for future work because pharmacists have a unique opportunity to interact with patients and evaluate the willingness of patients to pay for their medications. Pharmacists are also aware of the out-of-pocket costs for each of the prescribed medications. A collaboration between an ophthalmologist and a pharmacist could greatly improve patient care by encouraging glaucoma medication adherence and reducing cost related barriers.

## **Limitations**

The study has a number of limitations that should be recognized. First, both the physicians and patients knew they were being video recorded. This may have influenced their behavior during the visit. The GCPO study enrollment was not limited to newly diagnosed patients or new to physician patients. Therefore, it is difficult to make a causal inference between medication cost discussions and adherence since these discussions may have occurred for established patients during earlier visits. However, the study is strengthened by

the ability to follow patients over a 60-day period and electronically monitor adherence over this period of time. Electronic monitoring is currently the gold standard to evaluate medication adherence.<sup>144</sup> Although, there are still limitations when using electronic monitoring that may have had an effect on the study results. Williams et al. speculated that the use of MEMS may alter adherence behavior because participants are aware that information would be uploaded from the container.<sup>145</sup> There are also some ethical issues that have emerged regarding research using electronic monitoring devices. In a study by Ailinger et al., patients were not told that there was a special cap on their bottles or that there was a computer chip in the cap that recorded when they opened the bottle.<sup>146</sup> Another ethical issue is providing feedback to the patient regarding what the MEMS cap recorded. During research studies, investigators typically do not want to alter behavior so they choose not to discuss the adherence results. However, this could be an important opportunity to discuss adherence problems with a patient. Also, it is important to recognize that electronic monitoring is very costly and not practical for clinical use.<sup>144</sup> In this study, the patients knew the MEMS caps were monitoring adherence and the patients were not given feedback on their results.

The study was also limited because it included all glaucoma patients and not just those with medication cost problems. Another limitation of the study is the limited number of physicians (n=15). Due to this small number, we were unable to perform more sophisticated analytical methods such as GEE (generalized estimating equations).

The number of MEMS caps given per patient was unique depending on the clinic. This was due to a temporary shortage of MEMS caps at some of the clinics during enrollment. Therefore, some patients may not have received caps for all of their glaucoma medications. This may impact our medication adherence measures analyzed in Aim 3. Our medication adherence results may have been overestimated since prior research has found that patients who take more than one glaucoma medication are less adherent to the second medication.<sup>74,75</sup>



The study is also limited by the inability to identify, which medications were stored in each MEMS cap. Due to this limitation, the unit of analysis of adherence was the average adherence of all MEMS cap medications and not an individual medication. Also, it is possible that the MEMS cap may have caused patients to be more adherent than they normally would have.

When reviewing the glaucoma office transcripts it was sometimes difficult to identify if patients and physicians were discussing brand or generic medications because often times they use the names interchangeably. Therefore, we are limited in the ability to identify the frequency of discussions of generic versus brand medications. Instead, we evaluated the frequency of discussions of generic and brand medication combined.

Another limitation of the study was we were unable to calculate the number of brand versus generic glaucoma medications a patient was on despite the availability of medical records. A physician may have written a prescription for a brand name medication but the pharmacy could dispense generic if the physician did not mark, "dispense brand only".

The enrollment period of the parent study covered a span of three years. During this time some of the glaucoma medications used by study participants became generic. Therefore, we studied the discussion of medication cost across different medications and did not record the specific name of the medication being discussed.

Another limitation was the main coder was aware of the study hypotheses. Since hiring a second coder would have been cost prohibitive, we had to have one coder do the majority of transcripts. Future studies may want to budget for two coders to code all of the transcripts.

Another important limitation to be aware of is the problem with multiple comparisons. When you perform a large number of statistical tests, some will have a p-value less than 0.05 due to chance, even if all of the null hypotheses are true. Therefore, it is important to be aware that any time you reject a null hypothesis because the p-value is less than your critical value, it is possible that you are wrong because your significant result may be due to chance.

Finally, due to the demographic characteristics of the sample, our study results may not be generalizable to a different population. For example, the majority of the study participants had prescription drug coverage, which may have effects on the findings of our study.

## **Strengths**

Despite these limitations, this study has a number of strengths that make it a significant contribution to the knowledge base regarding patient-provider communication concerning medication costs in glaucoma patients. First, this study is the first to investigate communication concerning medication cost during glaucoma office visits. Second, this study is unique in its ability to examine the relationship between medication cost communication and adherence to glaucoma medications over a sixty-day period. We were also strengthened by our ability to measure adherence using electronic MEMS caps, which provides a less biased estimate of adherence compared to self-report.<sup>74</sup> Third, this study combined qualitative and quantitative methods to investigate the communication of 279 glaucoma patients and 15 ophthalmologists. This enabled us to investigate the extent and nature of medication cost communication in a geographically diverse sample of glaucoma patients. We were then able to look at the effect of these cost discussions on medication adherence. Finally, the study results provide practical guidance for medical professionals, patients, and caregivers that may improve patient care. Through effective communication concerning medication costs, patients and providers can work together to formulate a realistic and successful treatment plan.

## **Directions for Future Research**

Based on the implications and limitations mentioned above there are a number of future directions for research on patient-provider communication concerning medication cost in glaucoma patients and more broadly in patients with chronic diseases. First, future research

should continue to investigate the proposed conceptual framework with a larger and more socioeconomically diverse group of patients. Additionally, studies should include more ophthalmologists so that clustering at the physician level is possible during analysis. Future studies should measure some additional variables such as, patient beliefs regarding the necessity of glaucoma medications and physician knowledge of medication costs since this may reveal additional adherence barriers. It would also be helpful for studies to include more questions regarding cost related barriers to medication use such as, “Have you ever missed a dose of a medication because of the cost of the medication” or “Are you concerned with the cost of your glaucoma medications?” Future research would also benefit from limiting enrollment to new glaucoma patients and patients who have experienced cost problems in the past. This would allow researchers to delve deeper into the relationship between medication cost barriers, cost discussions, and medication adherence.

We were unable to investigate the relationship between patients who indicated cost is a problem during an office visit and medication adherence over time due to the small number of patients who indicated cost was a problem. A larger sample size would enable researchers to investigate this relationship. Future studies may want to restrict enrollment to patients who indicate cost is a problem and patients that report being nonadherent to their glaucoma medications. This would allow for a more rigorous evaluation of the theoretical framework.

Further, studies could investigate the effects of interventions aimed at improving patient-provider communication concerning medication cost during glaucoma office visits. An Internet-based intervention could be used to promote communication between patients and physicians regarding medication costs. These pre-recorded interactive Internet sessions could feature an ophthalmologist who discusses ways they can assist patients with lowering medication costs and improving medication adherence based on individual patient problems. Before the video begins, the patient would complete a short questionnaire that identifies their specific medication

cost problems. Then the video would be tailored to patient responses. The video could provide patients with questions to ask their physician during the next visit such as “Are there any generic equivalents for the medications I am taking?” The interactive session could also show how patients discuss difficult topics with their physician such as “I am unable to afford my medications so I haven’t been taking them”. Following the video, a printout could be generated for physicians and patients that discusses the patient’s individual problems and questions to discuss during the visit. Internet-based interventions have been used in the past to empower patients to manage their chronic diseases.<sup>147</sup> This may be a realistic and cost effective way to promote communication regarding medication costs for glaucoma patients.

Future research should also investigate the role of eye drop technique on medication cost. Patients with poor eye drop technique may be squeezing out too many drops, run out of their medication early, and have higher medication costs. Physicians may want to assess their patient’s eye drop technique to determine if proper technique could help save them money.

Another possible intervention that could be used to promote patient-provider communication concerning medication cost is a tailored text messaging intervention. Text messaging interventions have been used in a number of areas such as, to increase physical activity in sedentary children, suicide prevention, HIV medication adherence, and vaccine uptake.<sup>148-151</sup> Glaucoma patients who respond positively to, “It is hard to pay for my glaucoma medications” could be randomly selected to be in either the control group that receives usual care or the intervention group that receives monthly text messages that provide them with tips to decrease medication cost and how to talk to their physician about medication cost.

Future research should investigate the role pharmacists can play to improve glaucoma medication adherence. As mentioned in the implications section, pharmacists have the opportunity to evaluate medication cost problems at the point of care. One possibility is an intervention that requires pharmacists to evaluate medication cost problems of glaucoma

patients during dispensing. The study could evaluate the types of cost problems glaucoma patients have and how the pharmacist assists the patient to reduce these barriers.

Another area of research to consider is the role of electronic medical records (EMR) in improving patient care. EMR's have the ability to provide information on drug costs based on a patient's insurance plan. The majority of ophthalmologists enrolled in our study did not have access to this feature. Enhancing the EMR with accurate out-of-pocket medication costs at the time of care will assist physicians and patients in choosing the best treatment option. Another feature of an advanced EMR could be information about discounts given by specific pharmacies or insurance plans. For example, some pharmacies and insurance plans may give a discount if the patient has a 90-day versus a 30-day prescription. The effects of having an enhanced EMR could be investigated with an intervention that compares out-of-pocket costs for glaucoma patients that see physicians with enhanced EMR's and those that do not. The intervention could also look at differences in medication adherence.

## **Conclusion**

This study helps fill an important gap in the literature regarding patient-physician communication concerning medication cost in glaucoma. The literature frequently cited medication cost as a barrier to glaucoma medication adherence, however this was the first study to examine the nature of medication cost communication during glaucoma office visits.<sup>7,8,12</sup> We found that medication cost was discussed in less than a third of the medical visits and typically was initiated by physicians.

The qualitative analysis of the glaucoma office visits revealed that physicians proposed solutions to potential cost problems even when patients did not indicate cost was a problem. Patients may benefit from more tailored discussions relating to their individual concerns. Our study results indicate that patients who are new to glaucoma medications were less likely to be

adherent compared to prevalent medication users. We also found patients who had female physicians were less likely to be adherent to their glaucoma medications. Patients who reported difficulty paying for their prescription medications were significantly less likely to be adherent to their glaucoma medications. Future work should continue to investigate whether medication cost discussions are associated with adherence and perhaps limit enrollment to patients who report medication cost problems and medication nonadherence.

This study was able to provide the first glimpse into discussions regarding the cost of medications during glaucoma office visits. Future work should build on this and further explore the role of patient-physician communication concerning medication costs on glaucoma patient outcomes.

## APPENDICES

### APPENDIX A: Coding Tool

#### Cost Study Coding Sheet

<b>Transcript #:</b>	<b>Date:</b>
<b>Coder ID #:</b>	

Cost Discussions	Yes	No
Cost Discussion 1 Occurred	Y	N
Cost Discussion 2 Occurred	Y	N
Cost Discussion 3 Occurred	Y	N

Cost Discussion Initiator	Physician	Patient	Caregiver	Other
Initiator of Cost Discussion Segment 1 during the Baseline Visit	1	2	3	4
Initiator of Cost Discussion Segment 2 during the Baseline Visit	1	2	3	4
Initiator of Cost Discussion Segment 3 during the Baseline Visit	1	2	3	4

Key Communication Variables	Yes	No
Medication Cost Discussed during the Baseline Visit	Y	N
<b>If YES, then continue coding:</b>		
Patient Indicates that Cost is a Problem during the Baseline Visit	Y	N

Provider Behavior	Yes	No
Physician Asks About a Glaucoma Medication Cost Problem	Y	N
Physician Proposes a Solution to a Potential Glaucoma-Related Cost Problem***	Y	N
Physician Recommends Patient work with Pharmacist to Lower Glaucoma Medication Cost***	Y	N
Physician Asks How Much Patient is Paying for Glaucoma Medications	Y	N
Physician Recommends Patient Try 3-Month Supply of Glaucoma Medications to Reduce Cost	Y	N

Patient Behavior	Yes	No
Patient Changes Glaucoma Medication Regimen Due to Cost Problem***	Y	N
Patient Discusses Coping Strategies Used in the Past to Deal with Cost Problem***	Y	N

Insurance and Cost Discussed	Yes	No
Patients Health Insurance or Prescription Drug Coverage is Discussed	Y	N
Coinsurance or Copayment is Discussed	Y	N
Medication Assistance Programs are Discussed***	Y	N
Four Dollar Generics are Discussed	Y	N
Laser is Discussed as a Solution to a Medication Cost Problem	Y	N

\*\*\*Indicates if 'yes' write out what is discussed on the following page

Samples	Yes	No
Patient Requests Samples	Y	N
Physician Provides Samples	Y	N
Physician Discusses Being Unable to Provide Samples	Y	N

Medication	Yes	No
Term Brand or Generic Drug is Used	Y	N
Physician Initiates Discussion of Brand or Generic	Y	N
Physician Explains Difference Between Brand and Generic	Y	N
Patient Expresses Confusion of Brand versus Generic***	Y	N
Physician says Generic isn't Available	Y	N
Physician Offers to Write Prescription for Generic	Y	N
Physician Asks if Patient has a Preference for Generic or Brand	Y	N
Patient Expresses Preference for Generic	Y	N
Patient Expresses Preference for Brand	Y	N

\*\*\*Indicates if 'yes' write out what is discussed on the following page

Physician Proposes a Solution to a Potential Cost Problem	Y Only
---	--------

If yes: what is discussed?



Physician Recommends Patient work with Pharmacist to Lower Medication Cost	Y Only
--	--------

If yes: what is discussed?

Patient Changes Medication Regimen due to Cost Problem	Y Only
--	--------

If yes: what is discussed?

Patient Discusses Coping Strategies Used in the Past to Deal with Cost Problem	Y Only
--	--------

If yes: what is discussed?

Medication Assistance Programs are Discussed	Y Only
--	--------

If yes: what is discussed?


Patient Expresses Confusion of Brand versus Generic	Y Only
---	--------

If yes: what is discussed?

## Coding Rules

### Coding Rules for Provider-Patient Communication about Medication Cost during Glaucoma Office Visits

The first thing to record is the *transcript number*, your *coder ID (your initials)*, *date that you are coding the transcript*.

Read through the transcript at least once before coding. *You may want to highlight the sections that discuss anything relevant to medication cost. You may also want to mark on the transcript directly how you categorized each sentence.* This will be helpful when you talk about how you coded certain sentences with the other coder in future meetings.

If you have any questions about coding any portion of the transcript, please let me know.

#### CODING SHEET

Circle the appropriate Y/N boxes for the number of cost discussions that occur during a transcript. If only 1 cost discussion occurs then circle Y for Cost Discussion 1 Occurred and N for the remaining 2. If 2 cost discussions occur then circle Y for Cost Discussion 1 Occurred and Cost Discussion 2 Occurred and N for Cost Discussion 3 Occurred.

Circle either **1,2,3,4** respectively for physician, patient, caregiver or other depending on who initiated the cost discussion. If multiple cost discussion segments are present, circle who initiated for each individual segment. A cost discussion segment is defined as a discussion of one topic relating to medication cost. This discussion may continue throughout the transcript. Only when a new topic relating to medication cost is discussed, will a new initiator be recorded.

#### KEY COMMUNICATION VARIABLES

Please circle **Y** or **N** on the coding sheet as to whether each statement is discussed between the provider and patient during the office visit. *Do not look at discussion between the patient and the research assistant or fellow. You should only look at discussions when the doctor (D) is present.*

#### Medication Cost Discussed During the Baseline Visit

Discussion of medication cost, prescription drug insurance, and/or drug assistance programs. Discussion of samples is not sufficient to constitute a discussion of medication cost.

#### Example:

How expensive are these glaucoma medication drops?

#### Patient Indicates that Cost is a Problem during the Baseline Visit

Patient states that they are having difficulty-affording medications, medical visits or other glaucoma related costs OR patient responds that cost is a problem to a physician question

regarding glaucoma related costs. Code YES if patient mentions not taking medication because of cost.

Example:

I can't pay for these medications because my insurance won't cover them.

PROVIDER BEHAVIOR

**Physician asks about a Medication Cost Problem**

Physician asks a patient if they are having problems affording their medications

Example:

Do you have any problems paying for these medications?

**Physician Proposes a Solution to a Potential Cost Problem**

Physician provides a patient with a way to decrease glaucoma medication cost. Providing samples of medication does not count as a solution unless the physician relates it back to medication cost OR the patient previously discussed cost as a problem. Prescribing a generic does NOT count as a solution unless the physician proposes prescribing a generic to lower the medication cost OR the patient previously discussed cost as a problem.

Example:

When you get to the pharmacy, ask the pharmacist which medication is covered under your insurance and we will make sure to give you that one.

Now if you have trouble with that brand because of your pharmacy benefit plan just call the office and we'll get you a different brand.

I will give you a prescription but before you get that filled- I'm not going to give it to you today cause the sample should get you by before you spend money on a prescription-

**Physician Recommended Patient work with Pharmacist to lower Medication Cost**

Physician states that the patient should speak to a pharmacist to lower glaucoma medication cost

Example:

You should talk with your pharmacist because there are some programs available to reduce medication cost.

**Physician Asks How Much Patient is Paying for Medications**

Physician directly asks the patient how much they have to pay for their glaucoma medications.

Example:

How much do you pay for your Xalatan?

**Physician Recommends Patient Try 3-month Supply to Reduce Cost.**

Physician tells patient to try a 3-month/90 day supply because it may help them save money.

Example:

You may want to ask for a 90-day supply because sometimes that will save some money.

## PATIENT BEHAVIOR

### **Patient Change to Medication Regimen Due to Cost Problem**

Patient discusses changing or intending to change their glaucoma medication regimen because of cost problems (decreasing the dosing schedule, skipping doses, decreasing the number of drops administered, and stopping medication use). Code YES if patient asks to switch to a generic medication.

#### Example:

I've been taking less eye drops when they get low so I don't have to get my next prescription.

Um, I was going to ask you, um, a friend of mine told me that over at \_\_\_\_\_ (place) on \_\_\_\_\_ (road), they have a pharmacy and they sale prescriptions on their list for \$4.00. Where this little drops you gave me are \$45.00 and the first ones were \$90.00 (unclear) holy mackerel and I couldn't afford it so the pharmacist over there marked the common ones that he said they usually get but he said he didn't know if um would do or not but-

It's just like I said it's a matter of I forget. Um sometime maybe I forget purposely because they're so darn expenses ((laughs)) I mean, I figure if I use them half as much I'll only pay half the money. But I would rather just pay the money than go blind.

Yeah. Well there is some kinds of generics right? That I could use?

Yeah should I request not to take any medication because I'm so cheap?

### **Patient Discusses Coping Strategies Used in the Past to Deal with Cost Problem**

Patient states one or more coping methods they have used due to cost problems. Code YES if patient says they shopped around for cheaper medications. Code YES if patient says they saved money by switching to a generic in the past.

#### Example:

In the past I've spilt pills to make my medications last longer and reduce the cost of my medications.

I changed some other medications I got generic and some of blood pressure stuff and all. And,uh, (pause) and so basically all my other medications now are free.

## INSURANCE AND COST DISCUSSED

### **Patient Health Insurance or Prescription Drug Coverage is discussed**

Physician or patient talks about medical insurance coverage. Physician or patient talks about prescription drug coverage or prescription drug plan. Code YES if patient says they do not have insurance. \$4 generics do not fit into this category.

#### Example:

What insurance provider do you have?

Example:

When you go to the pharmacy, ask the pharmacist how much your prescription drug coverage plan will cover.

How much does this cost? Because I don't have insurance.

**Copayment or coinsurance is discussed**

Physician or patient discusses copayment. \$4 generics do fit into this category. If a patient or physician discusses an amount of money but does not mention whether this includes insurance then code NO.

Example:

How much do you pay each time you get a prescription from your pharmacy?

How much will I be responsible for paying after my insurance coverage?

**Medication Assistance Programs are discussed**

Physician or patient talks about medication assistance programs including medication cards and other forms of assistance

Example:

Since your insurance company won't cover the medications, let's see about signing you up with a medication assistance program.

**Four Dollar Generics are discussed**

Physician or patient talks about four dollar generics and/or what pharmacies sell these and/or what drugs are available for this offer

Example:

These medications are available for \$4 at Target or Walmart.

**Laser is Discussed as a Solution to a Medication Cost Problem**

The use of a laser is presented as an alternative to glaucoma medications for cost reducing purposes.

Example:

We should consider a laser as an alternative to eye drops to reduce cost of treatment.

**SAMPLES**

**Patient Requests Samples**

Patient asks if samples are available for their glaucoma medications or directly asks the physician for samples of glaucoma medications

Example:

Can you give me some more samples of the eye drops?

**Physician Provides Samples**

Physician gives the patient glaucoma medication samples during the visit. Do not count if physician gave samples in a prior visit unless he gives more.

Example:

Here, I'm going to give you some samples of the eye drops to get started.

**Physician Discusses being Unable to Provide Samples**

Physician informs the patient that samples aren't available or they are unable to provide them

Example:

I'm sorry but I don't have any samples to give you for this specific medication.

**MEDICATION****Term Brand or Generic Drug is used**

Physician or patient uses the words brand or generic when describing a glaucoma medication

Example:

Pilocarpine is a generic version of that drug.

**Physician Initiates Discussion of Brand or Generic**

Physician is the first person to use the term brand or generic.

Example:

Have you ever considered using generic medications to lower the cost of your drugs?

**Physician Explains Difference between Brand and Generic**

Physician describes the difference between brand and generic drugs

Example:

Generic medications are less expensive than brand medications.

**Patient Expresses Confusion of Brand versus Generic**

Patient indicates that they are confused about the difference between brand and generic drugs. Doctor prompts patient about whether they are taking a brand or generic multiple times.

Example:

Why would I want to switch to a Generic medication?

D-Do you take a generic or is it the brand name?

P-Uh.

**Physician says Generic isn't Available**

Physician tells the patient that a generic substitute is not available for their glaucoma medication. This can still be coded YES if the physician offers to write a prescription for a generic later in the conversation. Should be coded YES if physician mentions generic will be available in the near future.

Example:

This medication does not have a generic available.

**Physician Offers to Write Prescription for Generic**

Physician tells the patient that they will write a generic prescription for their glaucoma medication as an alternative to a brand. Do not code YES if the physician doesn't mention a brand name medication as an option. This may not be the physicians preference for treatment but they still provide this as an option to a patient.

Example:

If you would like, I can write you a generic prescription for this medication instead of the brand.

**Physician Asks if Patient has a Preference for Generic or Brand**

Physician asks the patient if they would like a brand name or generic glaucoma medication.

Example:

This medication is available in brand or generic, which would you prefer?

**Patient Expresses Preference for Generic**

A patient expresses a preference for a generic medication over a brand medication. If a patient responds positively to a physician writing a generic or if a patient initiates a discussion by asking if generics are available. Code NO if the patient does not express a preference for generic. Code YES if patient clearly states they have a preference for generic.

Example:

I would much rather save money and have the generic medication.

**Patient Expresses Preference for Brand**

A patient expresses a preference for a brand medication over a generic medication. Code 'NO' if the patient does not express a preference for brand. Code YES if patient clearly states they have a preference for brand.

Example:

I would much rather have the brand medication.



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