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An Exploratory Study of Factors Influencing Glaucoma Treatment Adherence

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Abstract

Purpose—To understand the factors that influence glaucoma treatment adherence with medication taking, prescription refills, and appointment keeping in order to develop an intervention for a specific population.

Patients and Methods—In-depth interviews were conducted with 80 individuals diagnosed with open angle glaucoma, glaucoma suspect, or ocular hypertension. Additional eligibility requirements were that all participants were: between the ages of 18–80; White or African American; spoke and understood English; and were taking daily doses of topical glaucoma treatments for at least the past year. Cross-tabulations and Chi-square tests were conducted to compare adherent and non-adherent individuals, classified as such based on self-report and medical chart/pharmacy data.

Results—Compared to adherent participants, non-adherent participants were less likely to: believe their eye doctors spent sufficient time with them; ask their eye doctor if they had any questions; know of benefits to taking their glaucoma medication regularly; and have someone help them take their glaucoma medications or drive them to eye appointments. Conversely, compared to adherent individuals, non-adherent participants were more likely to have difficulty remembering to take their medications and to believe their glaucoma would affect their eye sight in the future.

Conclusions—Non-adherent glaucoma patients struggle with a variety of issues related to consistent use of glaucoma medicine and routine eye care. Interventions are needed to address these modifiable factors related to glaucoma treatment adherence.

Keywords

open angle glaucoma; glaucoma suspect; adherence; compliance; glaucoma medications

Introduction

Glaucoma is expected to occur in 60.5 million people worldwide by 2010¹. Recommended management of glaucoma typically includes the use of medication(s) and the regular attendance of follow-up clinic visits, including visual field analysis, to monitor medication efficacy and disease progression. The benefits of lowering intraocular pressure by medications and surgical

intervention to reduce the risk of glaucoma development and progression are well established^{2–5}. However, patient adherence to glaucoma treatment regimens is often suboptimal.

Treatment adherence is a complex behavior⁶ that is influenced by many factors. To date, most glaucoma adherence studies have focused on use of medications, mainly eye drops^{7–11}. Fewer studies have identified factors that account for poor adherence to recommended follow-up medical visits^{12–14}. Barriers to glaucoma treatment adherence can be divided into four categories: provider factors, situational/environmental factors, medication regimen factors, and patient factors¹⁵.

Provider-Related Factors

The patient-provider relationship and communication has been noted as a potential barrier to adherence in studies of glaucoma¹⁶. Issues of trust¹⁷ and communication¹⁸ are especially important.

Medication-Related Factors

The number of medications, the number of doses of each medication, and the specific instructions for medication taking have all been used to represent medication regimen complexity. Findings regarding the role of regimen complexity are mixed. Higher daily dose frequency, especially of more than two administrations per day, is usually associated with increased glaucoma medication non-adherence^{16,19–21}.

Side effects also pose barriers to glaucoma medication adherence²², and may be related to discontinuation of therapy altogether¹². The cost of glaucoma medications has been cited as a medication adherence barrier in most^{17,21,23,24} but not all¹⁸ available studies.

Patient Factors

Evidence regarding the relationship between demographic factors such as race/ethnicity, gender, socioeconomic status, education, family history and age, and glaucoma treatment adherence is largely inconsistent. Ethnic disparities in adherence to glaucoma treatment or glaucoma awareness are often, but not always, noted^{14,18,20,21,25–27}. These associations may be confounded with education and socio-economic status^{20,26} which are often lower among African American patients.

Older patients may exhibit poor glaucoma treatment adherence due to difficulty reading prescription labels^{16,24,28}, comprehension and remembering^{18,21,24}, and manual dexterity and coordination^{23,24,29,30}. Data regarding gender differences in glaucoma adherence are inconsistent.

Non-adherent glaucoma patients are more likely to have impaired visual acuity or partial vision loss^{16,24,28}. Physical challenges in self-administering drops are commonly cited barriers to glaucoma adherence^{22,24,28,30}.

The most pervasive cognitive factor influencing adherence is forgetfulness^{19,21,22,24,30–33}. Other psychosocial factors that may influence glaucoma treatment adherence include beliefs and attitudes, self-efficacy, and social support. Lack of perceived benefit of treatment or satisfaction with treatment has been consistently associated with lower self-reported adherence^{22,34}. Practical and emotional supports may be important facilitators in treatment adherence⁶. Such supports might include physical assistance with medication management, as well as help with remembering, obtaining refills, and transportation to the pharmacy or clinic.

Clearly, glaucoma treatment adherence is influenced by a variety of factors. Much of the available evidence is based on studies that lack objective measures of adherence and did not study medical appointment adherence. The purpose of this study is to advance providers' understanding of the factors that influence glaucoma treatment adherence with medication taking, prescription refills, and appointment keeping as assessed through chart notes, medical/pharmacy records, and interviews. By comparing the responses of patients identified as adherent or non-adherent, this exploratory research will also stimulate the development of an intervention to improve glaucoma treatment adherence.

Patients and Methods

Study participants (N=80) were patients recruited from two eye clinics located in hospitals in the Southeast United States: a Veterans Affairs (VA) hospital and a large public hospital. Both of these hospitals offer subsidized onsite or mail-order pharmacies, making pharmacy records available for nearly all prescriptions. Eligibility for study inclusion required that all participants: were between the ages of 18–80; White or African American; had a telephone; spoke and understood English; were diagnosed with open angle glaucoma, glaucoma suspect or ocular hypertension; and were taking daily doses of topical glaucoma treatments for at least the past year. Participants who had eye surgery within 3 months of the date of medical chart review were excluded. While acuity and visual fields were not recorded, participants had to have sufficient corrected or aided vision to read and sign the informed consent and HIPAA (Health Insurance Portability and Accountability) authorization form on their own. The study received approval from the University Institutional Review Board and the respective research oversight committees of both participating hospitals.

Participants were recruited in two ways. Initially, flyers describing the study were placed in the eye clinics. Interested participants either approached study staff in waiting rooms or called the phone number listed on the flyer. Participants were screened for eligibility after signing a combined informed consent and HIPAA authorization form. If screening questions suggested eligibility, participants were interviewed and a medical chart review was conducted to confirm treatment and diagnosis. Medical chart review consisted of abstracting administrative and medical record data on adherence, including prescription medication-taking behavior, prescription renewals, and clinic appointments. This strategy resulted in the recruitment of few non-adherent individuals, so recruitment strategies were modified to obtain a more diverse sample.

With a Partial Waiver of HIPAA authorization, administrative clinic data were used to identify glaucoma patients who had missed at least one clinic appointment in the last year. For those patients, a medical chart review was conducted to screen for eligibility. Potential participants were then contacted by mail and then phone, and interviews were arranged after participants signed the combined informed consent and HIPAA authorization form.

Interviews were conducted by trained research assistants between April and December 2007. Participants were interviewed either over the telephone or in-person at a private room in each eye clinic.

Interviews included questions about background characteristics of the patient and open-ended questions about the participant's eye condition, prescription medication usage, facilitators and barriers to medication adherence, refill and clinic visit behavior, medication knowledge and health literacy, as well as psychosocial factors such as self-efficacy, attitudes, and social support. Interviews lasted from 30 to 90 minutes, depending on the number of medications being taken. Interview responses were reviewed for common themes and organized into coding categories. All interviews were coded by two raters independently. In cases of disagreement,

the coders met to resolve discrepancies, and if necessary, a third independent coder settled disputes.

The primary comparisons made were between adherent and non-adherent patients. Patients were identified as adherent or non-adherent with their glaucoma treatment through self-report and medical chart/pharmacy data on medication-taking, prescription refills, and clinic appointments. Participants were considered non-adherent with taking medication if there was both a physician note about non-adherence and a self-report of missing at least one dose of medication in a week. Refill non-adherence was defined as failing to refill any glaucoma medication in a timely manner, classified by a pharmacy record indicating at least one month lag in refill time, and a self-report of running out of medication before getting a refill. Participants were considered non-adherent with appointment-keeping if a review of clinic records and self-report revealed any clinic appointments missed in the past year. If a participant was non-adherent with medication, refills, or clinic appointments they were classified as non-adherent with respect to glaucoma treatment.

All statistical analyses were performed using SPSS 15 for Windows. Cross-tabulations, Pearson Chi-square, and Fisher's Exact tests were computed. Given the small sample size, as well as the large number of tests conducted, the focus is more on substantive differences rather than statistical significance. However, p-values are reported at the $p < .10$, $.05$, $.01$, and $.001$ levels. Findings reported here focus on issues related to provider, medication, and patient factors that were: 1) mentioned by the largest number of respondents; and 2) that, based on the literature, would be most likely to reveal differences between adherent and non-adherent individuals.

Results

Forty participants were recruited from each study site, for a total of 80 participants. Table 1 summarizes demographic information by study site. There was no significant age difference by study site; overall, the average age of participants was 62.6 years ($SD = 10.2$). There were significant differences in gender, race, and education by site. At the VA hospital, 95% of participants were male, compared to 30% at the public hospital. The majority of participants at both sites were African American; 100% of the public hospital and 85% of the VA hospital sample was African American. Finally, the VA sample tended to be more educated: 65% of VA participants had completed at least some college, compared to only 25% of the public hospital participants.

Sixty percent of the sample was classified as non-adherent, split evenly across study sites. Of those who were non-adherent, 67% ($N=32$) were non-adherent with respect to using their medicine as prescribed, 50% ($N=24$) were non-adherent with respect to refills, and 29% ($N=14$) were non-adherent with respect to appointment-keeping.

Table 2 shows comparisons between adherent and non-adherent participants on key dimensions believed to influence adherence.

Provider Factors

A large majority of both adherent (93.8%) and non-adherent (95.8%) participants trusted their eye doctors most to give them information about their eyes. However, non-adherent individuals were less likely to believe that their eye doctors spent sufficient time talking with them about their eye condition: only 72.7% of non-adherent participants felt ample time was spent with the doctor, compared to 93.8% of adherent individuals ($p<.05$). Further, there was a trend (non-significant) showing that compared to adherent participants, non-adherent individuals were

less likely to report that they would ask their eye doctor (83.3% versus 96.9%) or pharmacist (25.0% versus 43.8%) if they had any questions about their eye medications.

Medication Factors

There did not appear to be any differences in adherence with respect to regimen complexity. Adherent and non-adherent individuals were equally likely to be taking other medications, to have had their prescriptions changed by their eye doctor, and to be taking the same average number of glaucoma medications. Similarly, non-adherent participants were no more likely than adherent individuals to mention side effects of glaucoma medications as a barrier to adherence.

Patient Factors

Several patient factors were examined, which were grouped into the following categories: information seeking and comprehension; physical challenges; remembering; attitudes; social support; and self-efficacy/control beliefs (or confidence in adhering to the prescribed treatment).

Information seeking and comprehension—There was no difference in information seeking by level of adherence. Approximately half of all participants reported looking for information about their glaucoma. Although the difference was not statistically significant, non-adherent participants were somewhat less likely than adherent individuals (75.0% versus 90.6%) to feel that they understood all the information they had received about their eyes. Similarly, non-adherent individuals were slightly less likely to report reviewing the information that comes with their eye medications (70.8% versus 84.4%).

Physical challenges—Although not statistically significant, 22.9% of non-adherent participants, compared to only 9.4% of adherent individuals, stated that a barrier to medication taking was difficulty with the proper administration of drops. Administration issues included getting the proper number of drops into the eye and difficulty squeezing the bottle.

Remembering—Memory was significantly associated with medication-taking and was also a potential factor influencing appointment-keeping. Approximately fifty-six percent of non-adherent participants cited scheduling issues, such as remembering when to take their medications, to be a barrier to medication-taking, compared to only 18.8% of adherent participants ($p < .001$). Similarly, 43.8% of non-adherent patients cited forgetting, having the wrong date, or other scheduling conflicts as a reason for missing appointments ($p < .05$), compared to only 18.8% of adherent participants. Adherent and non-adherent individuals were equally likely to mention reminder systems as a facilitator to adherence for both medication-taking and appointment-keeping.

Attitudes—When asked about the benefits of taking their medication regularly, adherent and non-adherent individuals did not differ in their responses regarding whether medication would help to reduce pressure, control glaucoma, prevent blindness, or provide immediate symptom relief. Across all participants, few (12.5%) stated that they did not believe there were benefits; but more non-adherent patients than adherent patients indicated that they did not know of any benefits to taking their medication regularly (20.8% vs. 3.1%, $p < .05$). Similarly, while there were no differences in reported “downsides” to taking medications in terms of inconvenience, non-adherent individuals were less likely to state that there were no downsides *at all* to taking their glaucoma medications (50.0% non-adherent vs. 75.0% of adherent respondents, $p < .05$). Importantly, when asked a direct question regarding medication efficacy, nearly all participants (89%), regardless of adherence, believed that taking their medication regularly would prevent or reduce loss of vision.

Social support—There was some evidence that social support may facilitate adherence in these patients. Only 4.2% of non-adherent individuals reported that having someone to help them made it easier to adhere, compared to 18.8% of adherent participants (ns). When asked a similar question regarding appointment keeping, there was no difference in responses: approximately 24% of participants reported that having someone to help, in ways such as driving them to or reminding them about their appointment, made it easier to keep clinic appointments. When specifically asked if anyone had ever helped with their glaucoma, about 65% of participants across both groups reported receiving help. However, when asked about how people had helped them, some differences between non-adherent and adherent participants emerged. Compared to adherent individuals, non-adherent individuals were less likely to report receiving help with medication administration (8.3% versus 25.0%, $p < .10$), or with being driven to clinic appointments (29.2% versus 53.1%, $p < .05$).

Self-efficacy/control beliefs—Participants were asked how they felt about having glaucoma, and how it affected their daily lives and their future. There were few differences in responses based on adherence. While some participants expressed negative emotions, such as anger (29% of the overall sample), fear (13.8% of the overall sample), or sadness (13.8% of the overall sample), the most common response was one of neutrality: 32.5% of respondents did not report any emotional response to having glaucoma; they were not bothered by it. When asked how it affected their daily lives, there was a non-significant trend for non-adherent participants to report glaucoma affecting their daily tasks more than adherent participants (54.2% of non-adherent individuals versus 37.5% of adherent individuals). Finally, non-adherent individuals were significantly more likely to believe that in the future, glaucoma would affect their eyesight (22.9% of non-adherent participants, versus 3.1% of adherent participants, $p < .05$).

Discussion

This article reports on a study of 80 predominantly African-American glaucoma patients, using data from medical sources (charts, appointment records, and pharmacy records) along with in-depth interviews to explore factors associated with three dimensions of treatment adherence.

The findings are generally consistent with the literature. One contrary finding was that, in contrast to several other studies^{16,19–21}, regimen complexity did not appear to be associated with adherence in our sample. However, we believe this may be due to an insensitive measure; the measure we used captured whether or not participants were taking other prescription medications and did not include frequency or method of dosing. A more sensitive measure may have revealed differences in adherence based on medication regimen complexity.

In our study, non-adherent individuals were more likely than adherent patients to believe that glaucoma would affect their eyesight in the future. Perhaps this was because non-adherent individuals knew that they were not taking their medication properly and understood that this could affect their vision. In contrast, adherent patients were less likely to believe their future vision would be affected because they were taking steps to control vision loss. Alternatively, perhaps non-adherent patients were more fatalistic, and did not believe that glaucoma medications would prevent vision loss, while adherent patients were more optimistic. More research is needed to better understand this difference.

In our study, patient-provider communication but not trust appeared to play a role in non-adherence. While most patients trusted their physicians, non-adherent patients were less likely than adherent individuals to believe that their eye doctors spent sufficient time with them, and were also less likely to ask their eye doctor if they had questions. Thus, particularly for non-adherent patients, providers may need to be sensitive to the need for establishing a rapport with

patients such that patients perceive a willingness to communicate and feel comfortable taking the time to ask questions.

As in previous studies we found that challenges with administering eye drops are issues of concern^{22–24,28,30}. Memory, which has also been a well-documented barrier to adherence,^{19,21,22,24,30–33} influenced our non-adherent participants' ability both to take their medicines and to make their clinic appointments. A lesser documented factor influencing glaucoma adherence is social support⁶. In our study, instrumental support appeared to influence both medication and appointment adherence; however, the particular determinants were different. The instrumental support for appointment keeping was having someone to drive the patient to an appointment, whereas the social support associated with medication adherence had to do with providing assistance administering medications. This suggests the utility of distinguishing between different aspects of glaucoma treatment adherence; if the determinants are different, then the particular messages and strategies for interventions developed to increase glaucoma treatment adherence would also need to be different.

While most patients, even the non-adherent respondents, stated that they felt they understood all the information they had received about their eye health and glaucoma, knowledge about treatment appeared to be higher among adherent participants: non-adherent individuals were more likely to be unaware of any benefits to taking glaucoma medication regularly.

An important issue that emerged in the early stages of this study was that adherent patients were more likely to volunteer to take part in the research. This may be due to their greater likelihood of being at the clinic sites, that adherent individuals are more eager to discuss their condition, or both. In the study reported by Tsai et al.¹⁵ most study participants did not acknowledge non-adherence. The use of medical record sources of information in our study was important for identifying non-adherence that patients might be reluctant to report.

There are limitations to this study as to all research. The sample size is modest though larger than in some related studies^{15,18}. Because of the small sample size, we only examined the broad category of non-adherence to glaucoma treatment regimens and could not examine differences in non-adherence with medication taking, refills, and appointment keeping. Future research should consider these distinct forms of non-adherence. There were variations in our recruitment and interviewing methods that could have potentially introduced bias to our sample. We did not screen for cognitive impairment; however two mechanisms were in place to reduce the likelihood of data being utilized from an individual suffering from cognitive impairment. First, since the rate of cognitive impairment increases with advanced age^{35, 36} we limited respondents to 80 years-old or younger. Second, interviewers were trained to recognize cognitive impairment and were instructed to terminate interviews from individuals believed to be cognitively impaired.

Our sample was not representative of all glaucoma patients. Our sample was drawn from a Veterans Affairs Hospital and a public hospital. Participants were relatively homogeneous: mostly African American and male, with low socioeconomic status. Our sample was drawn from the same population that will ultimately be the focus of our intervention. Nevertheless, while not representative, this population may be at greater risk for uncontrolled glaucoma complications and subsequent visual impairment^{26,27,31,37}, so the present research fills an important gap in the literature.

This in-depth qualitative analysis and comparison of adherent and non-adherent glaucoma patients has implications for healthcare policy as the aging population increases and as treatment adherence potentially becomes an increasingly challenging and costly problem. This research also provides important information to guide the development of interventions to

improve glaucoma treatment adherence. We will use these data to help with the development of an automated, interactive, and tailored telephone intervention designed to increase adherence to glaucoma treatment. This information could also be useful for other types or models of intervention.

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Table 1

Demographic Characteristics of Participants (n=80)

	Mean (SD) or % (n)	Public Hospital Mean (SD) or % (n)	VA Hospital Mean (SD) or % (n)	Chi-Square or T
<u>Age</u>	62.64 (10.28)	62.45 (9.47)	62.83 (11.15)	T=-2.23
<u>Sex</u>				
Male	62.5% (50)	30.0% (12)	95.0% (38)	$\chi^2 = 36.053^{***}$
<u>Race</u>				
Black/African American	92.5% (74)	100.0% (40)	85.0% (34)	$\chi^2 = 61.09^{***}$
<u>Education</u>				
Completed some high school or less	20.0% (16)	25.0% (10)	15.0% (6)	
Completed high school/GED	35.0% (28)	50.0% (20)	20.0% (8)	
Completed some college	23.8% (19)	12.5% (5)	35.0% (14)	
Completed a 4 year college degree or more	21.2% (17)	12.5% (5)	30.0% (12)	$\chi^2 = 13.288^{**}$

*
= p<.05**
= p<.01***
= p<.001

Table 2

Provider, Medication, and Patient Factors Associated with Glaucoma Treatment Adherence

Variable (Coded as Dichotomous; %'s shown responded Yes)	Adherent % (32)	Non- adherent % (48)	Chi-square (or T)
Provider Factors			
Would trust eye doctor/ophthalmologist most	93.8	95.8	.18
Would trust general physician most	6.3	10.4	.42
Doctor spends enough time	93.8	72.7	5.45**
If had questions about eye medicine, would ask eye doctor	96.9	83.3	3.53*
If had questions about eye medicine, would ask pharmacist	43.8	25.0	3.08*
Medication Factors			
Taking other prescription medications	93.3	89.4	.35
Doctor changed medications	73.3	70.2	.09
Average number of glaucoma medications	2.5	2.25	.96
Side effects make it hard to take medication	25.0	14.6	1.37
Patient Factors			
Administration (e.g. getting it in, bottle hard to squeeze)	9.4	22.9	2.44
<i>Information Seeking:</i>			
Looked for information about glaucoma	56.3	52.1	.13
Always (yes)/usually understands information about glaucoma	90.6	75.0	3.08
Sometimes/never understands information about glaucoma	9.4	25.0	
Looked at information that comes with eye medicine	84.4	70.8	1.94
<i>Remembering:</i>			
Schedule makes it hard to take medication	18.8	56.3	11.14****
Forgetting or schedule makes it hard to keep clinic appointments	12.5	25.0	1.88
<i>Attitudes:</i>			
Taking medication regularly will reduce pressure	46.9	41.7	.21
Taking medication regularly prevent blindness in future/control glaucoma	46.9	41.7	.21
Taking medication regularly will provide Immediate symptomatic relief	34.4	35.4	.01
There is no benefit to taking medication regularly	9.4	14.6	.48
Don't know if there are any benefits to taking medication regularly	3.1	20.8	5.08**
No downsides to taking medication regularly	75.0	50.0	5.00**
Inconvenience	6.3	8.3	.12

Variable (Coded as Dichotomous; %'s shown responded Yes)	Adherent % (32)	Non-adherent % (48)	Chi-square (or T)
Believed medication taking will prevent/reduce loss of sight	87.5	89.6	.08
<i>Social Support:</i>			
Having someone help makes it easy to take medication	18.8	4.2	4.54*
Having someone help makes it easy to make eye clinic visits	25.0	22.9	.05
Someone helps with eye condition	68.8	62.5	.33
Someone reminds to take medication	28.1	39.6	1.11
Someone puts drops in eyes	25.0	8.3	4.18*
Someone reminds about appointment	9.4	20.8	1.85
Someone drives to appointment	53.1	29.2	4.64**
<i>Self-efficacy/control beliefs:</i>			
Feel anger/disgust about having glaucoma	28.1	29.2	.01
Feel fearful about having glaucoma	9.4	16.7	.86
Feel sad about having glaucoma	9.4	16.7	.86
Feel neutral/not negative about having glaucoma	31.3	33.3	.04
Feel non-emotional, negative about having glaucoma	15.6	22.9	.64
Having glaucoma affects daily tasks	37.5	54.2	2.14
See it affecting my eye sight in the future	3.1	22.9	5.90**

*
p ≤ .1

**
p ≤ .05

p ≤ .01

p ≤ .001