Published in final edited form as:

Optom Vis Sci. 2016 July ; 93(7): 731–737. doi:10.1097/OPX.0000000000000856.

Communication Predicts Medication Self-efficacy in Glaucoma Patients

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Abstract

Purpose—Medication self-efficacy, or patients' confidence that they can perform medication-related behaviors, is associated with better glaucoma medication adherence. Little is known about how to enhance glaucoma patients' medication self-efficacy. Our purpose is to examine whether patient-provider communication increases glaucoma patients' medication self-efficacy.

Methods—During an 8-month cohort study of 279 glaucoma patients and 15 providers, two office visits were videotape-recorded, transcribed, and coded for six patient-provider communication behaviors. A validated scale was used at baseline and 8-month follow-up to assess patients' confidence in overcoming adherence barriers (adherence barriers self-efficacy) and carrying out tasks to use eye drops correctly (eye drop task self-efficacy). We ran two generalized estimating equations to examine whether more frequent patient-provider communication during office visits predicted increased patient adherence barriers self-efficacy and eye drop task self-efficacy at 8-month follow-up.

Results—For each additional topic providers educated about, patients reported an average increase of 0.35 in self-efficacy in overcoming adherence barriers ($p<0.001$). Patients also reported an average increase of 1.01 points in eye drop task self-efficacy when providers asked about patients' views of glaucoma and its treatment versus not ($p<0.001$). Patients who asked more

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Drs. Blalock, Carpenter, Giangiacomo, Hartnett, Muir, Sayner, Sleath, and Tudor indicate no conflict of interest. Dr. Robin has been a consultant for Biolight, Lupin Pharmaceuticals, Sucampo, and TEVA pharmaceuticals and he does paid lectures for Merck and Allergan. Also, Dr. Robin has been a consultant for and has stock options in Glaukos and Aerie Pharmaceuticals, and is on the board of Aerie Pharmaceuticals. All authors have contributed to, read, and approved the final article.

medication questions (p<0.001) and African American patients (p<0.05) reported lower adherence barriers self-efficacy by 0.30 and 2.15 points, respectively. Women had a 0.63 lower eye drop task self-efficacy than men (p<0.05).

Conclusions—When providers educate glaucoma patients and assess patient views about glaucoma and its treatment, patients report higher medication self-efficacy. Providers should be aware that patients who ask more medication questions may have less confidence in their ability to overcome barriers to adherence.

Keywords

glaucoma; self-efficacy; patient-provider communication; medication adherence; eye drop technique

Glaucoma is the leading cause of irreversible blindness worldwide, affecting approximately 60 million people.[1–3] Although glaucoma medications can slow disease progression and prevent blindness by lowering intraocular pressure, patients are unlikely to experience the clinical benefits of their glaucoma medications if they do not adhere to their medication regimen.[4–6] Because glaucoma medication non-adherence rates range from 40–72%,[4, 5, 7, 8] researchers have attempted to identify and classify factors that promote and discourage patient adherence.[9] Although numerous factors affect adherence, self-efficacy is a patient-level factor that has consistently predicted patient adherence in chronic diseases generally[10–12] and glaucoma specifically.[13–15]

Self-efficacy is defined as a person's confidence to carry out a specific task in order to achieve a desired outcome.[16, 17] Because glaucoma medications are administered via devices (i.e. eye drop bottles), patients may possess two types of medication self-efficacy: confidence to adhere to their regimens and confidence to administer their eye drops correctly.[14] For glaucoma patients, higher adherence barriers self-efficacy has been associated with better self-reported medication adherence[14, 15] as well as better medication adherence over a 60-day period as measured by electronic caps.[13]

Qualitative and quantitative studies have documented that patient-provider communication, including provider education and patient question-asking, are associated with better medication adherence for glaucoma patients.[13, 18, 19] Although these previous studies have found direct links between communication and patient adherence, theoretical models posit that patient-provider communication most likely affects adherence indirectly through patient-mediated variables like increased self-efficacy.[20–22] Indeed, in a study of HIV patients, adherence self-efficacy mediated the relationship between positive provider interactions and patient medication adherence.[23] To our knowledge, no studies have examined whether patient-provider communication increases medication self-efficacy for glaucoma patients.

Our purpose is to address this research gap by examining whether patient-provider communication increases two types of medication self-efficacy for glaucoma patients. Using transcripts from two separate audiotaped office visits, we investigate whether six patient-provider communication variables are associated with glaucoma patients': 1) self-efficacy to

overcome adherence barriers and 2) self-efficacy to carry out specific tasks for using eye drop medications correctly. We hypothesize that patients will report higher self-efficacy levels when there is more frequent patient-provider communication during the office visits.

MATERIALS AND METHODS

Procedures

Data for this multisite cohort study were collected from six ophthalmology practices (2 private offices and 4 academic ophthalmology departments) between 2009 and 2012. Four of the six practices were located in the southeastern United States, and the remaining two were located in the mid-Atlantic and West. Providers were told that the goal of the study was to learn about communication during glaucoma visits. Of the 16 providers invited to participate in the study, 15 agreed to participate.

Providers completed a demographic questionnaire and clinic staff referred potentially eligible patients to a research assistant, who explained the study to patients and administered an eligibility screener. Eligible patients: 1) were ≥18 years of age; 2) spoke English; 3) were glaucoma or glaucoma suspect patients; and 4) were mentally competent as determined by the Mental Status Questionnaire.[24] Ineligible patients were given $5 to thank them for their time. Eligible patients provided informed consent, were enrolled, and had their office visit videotape-recorded. Videotapes were kept and the patient was followed for the 8-month study period if the patient was either: (a) newly-diagnosed with glaucoma and received a new prescription for glaucoma medications or (b) was already taking glaucoma medications.

There were three study visits: baseline, 4–6-week follow-up, and 8-month follow-up. Participants had their medical visits videotape-recorded at the baseline and 4–6-week visits. Immediately after their baseline and 8-month medical visits, a research assistant interviewed patients in a private examination room to assess their medication self-efficacy. Patients received $20 at each of the three visits to increase participant retention over the 8-month study period. This study received Institutional Review Board (IRB) approval and adhered to the tenets of the Declaration of Helsinki.

Measures

The medical visit videotapes were de-identified and transcribed verbatim. The transcripts were reviewed by a research assistant who met twice a month with the investigators to develop a study codebook that contained the coding categories and rules. The coding rules and coding transcript sheets can be obtained by contacting the study principal investigator (Dr. Name Blinded). Three independent coders then used this codebook to code the transcripts for the patient-provider communication behaviors described below.

Over the course of the study, the three coders coded 25 of the same transcripts, which were selected at random, and met monthly to discuss discrepancies. Inter-rater correlations were used to assess inter-coder reliability. Inter-rater reliability for the variables ranged from 0.75 to 1.0. If the communication behavior occurred very rarely, that limited our ability to calculate inter-rater reliability. In those cases, we calculated percent agreement between the coders; percent agreement was 0.72 to 1.00 for these variables.

Patient-Provider Communication Variables

Patient question-asking about glaucoma medications—Patients' medication-related questions, included questions about medication regimen, installation procedures, side effects, purpose, adherence strategies, and other questions, were identified from each office visit transcript and recorded. A question-asking summary score was then created by adding together the total number of medication questions the patient asked at the baseline and 4–6-week follow-up visit. If the patient asked the same question at both time points, this was recorded as two separate questions.

Provider communication behaviors—For each visit, the coders documented whether the provider educated about the following glaucoma topics: (a) physical changes related to glaucoma; (b) emotional changes related to glaucoma; (c) diagnosis; (d) family history; (e) goals of treatment; (f) how to problem-solve glaucoma-related issues (not including managing physical or emotional changes); (g) intraocular pressure; (h) likelihood of long-term therapy; (i) glaucoma management plan; and (j) prognosis. Provider statements were coded into only one category; thus, coding categories were mutually-exclusive. Definitions of the 10 provider education categories listed above are included in the appendix. A provider education summary score was then created by adding together the total number of areas for which the provider educated the patient across the baseline and 4–6-week follow-up visit. If the provider educated about the same topic area at both office visits, this was recorded as two separate instances of education.

For each visit, the coders also recorded whether the provider: 1) asked the patient about their views of glaucoma and/or its treatment; 2) asked about patient confidence in using eye drops; 3) assessed if the patient had any questions; and 4) asked the patient to demonstrate their eye drop technique. Results were then summarized across both visits and each of the four provider communication behaviors listed above were coded as: 0= provider did this at neither visit, 1= provider did this at one visit, and 2= provider did this at both visits.

Glaucoma medication self-efficacy—Immediately after the baseline and 8-month follow-up medical visit, patients completed a 35-item, validated, glaucoma medication self-efficacy questionnaire.[14] The questionnaire strongly correlates with self-reported and electronic measures of medication adherence.[13, 14] The questionnaire possesses two subscales. The first subscale included 21 items that assess confidence in overcoming adherence-related barriers (i.e. adherence barriers self-efficacy), such as being able to take medications when travelling or when they cost a lot of money. The second subscale was comprised of 14 items that assess confidence in carrying out specific tasks to use eye drops correctly (eye drop task self-efficacy), including squeezing the bottle, getting the right number of drops into the eye, and not touching the eye with the bottle. Response options ranged from 1= 'not at all confident' to 3= 'very confident.' Items were summed for each scale and ranged from 21 to 63 for adherence barriers self-efficacy (Cronbach α=0.93) and 14 to 42 for eye drop task self-efficacy (Cronbach α=0.84). Higher scores indicated greater self-efficacy.

Health literacy—Immediately before patients' baseline office visit, the Rapid Estimate of Adult Literacy in Medicine (REALM) was administered to assess health literacy.[25] The REALM is a validated, rapid screening instrument that identifies patients who have difficulty reading common medical terms.[25, 26] REALM scores were then dichotomized to represent reading levels at or below eighth grade (0–60) or at or above ninth grade and above (61–66).

Demographic and clinical characteristics—On the baseline questionnaire, patients reported their age (in years), gender, and race. Race was measured as a categorical variable (White, African American, Asian, Native American, and Hispanic) and then dichotomized to African American and non-African American. Prior use of glaucoma medications was assessed using a categorical variable that ranged from 1= 'less than 6 months' to 5= '5 years or more.' Patients also indicated the number of glaucoma medications they were using. The severity of glaucoma for the worse eye was extracted from the patient's medical chart at baseline and classified using the mean deviation of the eye, in decibels (dB), from the last reliable visual field and recoded as mild (≥6 dB), moderate (between −12 dB and −6 dB), and severe (≤ −12 dB) according to the Hodapp-Parrish-Anderson criteria.[27]

On the provider questionnaire, providers reported their age, gender, and race. Provider race was measured as a categorical variable (White, African American, Asian, Native American, and Hispanic). They also indicated whether they were a glaucoma specialist or not and the number of years since they had graduated from medical school.

Data Analysis

We used SAS Version 9.3 (Cary, NC) to perform all analyses. We used descriptive statistics to characterize the sample and then ran chi-square tests and t-tests, as appropriate, to compare patients who completed the study with those who were lost to follow-up. We then ran two generalized estimating equations (GEEs) to determine whether patient-provider communication at the baseline and 4–6-week follow-up visits predicted increased adherence barriers self-efficacy and eye drop task self-efficacy at the 8-month follow-up visit (α=0.05). The GEE method is an extension of the generalized linear model. It accounts for the intra-provider correlation of data from the multiple subjects enrolled for each provider to provide consistent estimates of model parameters.[28] Six patient-provider communication variables, including the number of glaucoma medication topics the provider educated about, the number of glaucoma medication questions the patient asked, whether the provider asked about patient views of glaucoma and its treatment, whether the provider asked about patient confidence in using eye drops, whether the provider assessed if the patient had questions, and whether the provider asked the patient to demonstrate eye drop technique, were included as independent variables in each of the two GEE models. Each GEE model was clustered by provider and controlled for the following: provider age and gender; patient age, gender, race (African American vs not), and years of education; whether the patient was new to glaucoma medications; the number of glaucoma medications the patient was using; patient health literacy level; patient glaucoma severity in the worse eye; and patient baseline self-efficacy. Provider race was not included as a control variable because we only had one non-White physician.

RESULTS

Sample Characteristics

Eighty-six percent (n=279) of eligible patients participated in the study and completed the baseline visit (Table 1). Eight-month adherence barriers self-efficacy and eye drop task self-efficacy values were missing for 22 and 28 patients, respectively. Missing data were primarily due to losing 21 patients to follow-up. There were no demographic or clinical differences between those with and without an 8-month adherence barriers self-efficacy score. Those without 8-month eye drop task self-efficacy scores were less likely to have their provider assess whether they had questions (Pearson $\chi^2 = -9.87$, df=3, $p<0.01$) and had providers who educated about fewer glaucoma topics ($t_{(277)} = -2.01$, $p<0.05$) than those who had 8-month eye drop task self-efficacy scores.

Ten of the fifteen (67%) providers were male. Fourteen providers were White and one was African American. Provider age ranged from 26 to 66 years (mean 40.8 years, SD= 11.7 years). Eighty percent (12) of providers were glaucoma specialists. The average years since graduation from medical school was 12.2 years (SD=11.4 years, range=1–38 years).

Patient-provider Communication

Across both office visits, on average, providers educated about 3 glaucoma topics (SD=2.3, range=0–10) and patients asked 2.5 medication-related questions (SD=3.0, range=0–17). Providers rarely assessed patient views about glaucoma and its treatment or asked patients to demonstrate their eye drop technique; these communication behaviors occurred in fewer than 10% of visits. Providers asked about patient confidence in using eye drops more frequently; this occurred 24% (n=68) of the time at one visit and 7% (n=18) of the time at both visits. Providers assessed whether the patient had questions even more frequently; 33% (n=92) at one visit and 25% (n=71) at both visits.

Generalized Estimating Equation Results

Table 2 presents the GEE results examining the relationships between patient-provider communication over the two tape-recorded visits and self-efficacy at the 8-month follow-up visit. When providers educated patients about more glaucoma topics, patients reported a significant increase in their confidence to overcome adherence-related barriers ($\beta=0.35$, $p<0.001$). For every topic that providers educated about, patients saw a 0.35 increase, on average, in their adherence-related barriers self-efficacy score. In contrast, patients who asked more questions about their glaucoma medications reported less adherence barriers self-efficacy than patients who asked fewer medication questions ($\beta=-0.30$, $p<0.001$). African Americans reported lower adherence barriers self-efficacy than non-African Americans ($\beta=-2.15$, $p<0.05$), meaning that African American patients scored 2.15 points lower, on average, on the adherence barriers self-efficacy scale than non-African American patients.

When providers asked patients about their views of glaucoma and its treatment, patients reported a significant increase of almost 1 point on average, in their eye drop task self-

efficacy (β=1.01, p<0.0001). Women reported less eye drop task self-efficacy when compared with men (β=−0.63, p<0.05).

DISCUSSION

This is the first study to examine whether patient-provider communication increases the medication self-efficacy of glaucoma patients. Our hypothesis that more frequent patient-provider communication would be associated with higher levels of patient self-efficacy was partially supported; two of five provider communication behaviors predicted a significant increase in patient self-efficacy. Contrary to our hypothesis, we found that patients who asked more medication-related questions reported a decrease in self-efficacy at 8-month follow-up. None of the communication behaviors were significantly associated with both types of self-efficacy (adherence barriers and eye drop task), suggesting that the relationship between patient-provider communication and patient self-efficacy is complex and warrants further study.

Two provider communication behaviors, educating about glaucoma and asking about patient views of glaucoma and its treatment, were significantly associated with an increase in patient-reported self-efficacy. Although education alone is unlikely to improve patient adherence,[29] our results suggest that education may help patients feel more confident they can overcome adherence barriers, which has been associated with better adherence to glaucoma medications in previous studies.[13, 14] It is also possible that providers who spend more time educating their patients may be considered more patient-centered. A previous study with Danish cancer patients found that patients who reported that their provider was more attentive also reported greater self-efficacy to manage their disease.[30] Similarly, HIV patients who reported more frequent positive interactions with their physicians had greater adherence self-efficacy.[23] Thus, taking the time to educate patients about glaucoma and assess their views may be effective methods for increasing medication self-efficacy, and interventions designed to increase patient medication-related self-efficacy should consider including components to help providers communicate with patients in a more patient-centered manner.

Future studies should explore whether self-efficacy mediates the relationship between provider communication and patient adherence to glaucoma medications. Although previous research has found direct links between patient-provider communication and medication adherence,[13, 31] it is likely that this relationship may be mediated by self-efficacy.[20, 21] Indeed, one study with HIV patients found that the relationship between communication and adherence is almost completely mediated through increased self-efficacy.[23] Because we found that women and African Americans reported lower medication self-efficacy, future studies should also examine whether the effects of communication on self-efficacy vary by patient race and gender.

Neither asking about patient confidence in using eye drops (p=0.40) nor asking patients to demonstrate their eye drop technique (p=0.54) were associated with patient eye drop task self-efficacy. Without information about whether and how often patients received eye drop technique instruction and whether patients received quality technique instruction prior to the

visits that were tape-recorded as part of this study, it is difficult to make definite conclusions about how technique education is related to patient technique. Patient eye drop task self-efficacy scores were very high at baseline and follow-up, and previous analyses from this study have shown that despite these high self-efficacy scores, most patients demonstrate suboptimal eye drop technique.[32] A similar issue regarding patient overconfidence in medication administration abilities has been reported in the pediatric asthma literature.[33] Thus, patients may be overconfident in their ability to use their eye drops correctly, limiting our ability to show relationships between communication and increased self-efficacy. Even though asking about patient views of glaucoma and its treatment only occurred in fewer than 10% of visits, this provider communication behavior was significantly related to increased eye drop task self-efficacy. Future studies should explore why asking about patient views would improve eye drop task self-efficacy more than asking about confidence in using eye drops or asking patient to demonstrate their eye drop technique.

We were surprised that patients who asked more medication-related questions during their office visits reported lower confidence to overcome adherence-related barriers. Previous qualitative research with glaucoma patients found that non-adherent patients were less likely to ask their provider questions.[19] Thus, we assumed that question-asking would result in patients receiving more information about their medications, which could increase their confidence to use their medications as prescribed.[34] One possible explanation for this finding could be that asking questions did not result in the patients being able to overcome particular adherence-related barriers; hence, their confidence levels remained low. For example, if a patient had difficulty paying for their glaucoma medications and asked the provider a cost-related question, simply answering the patient's question may not have helped the patient pay for the medication. Thus, their adherence barriers self-efficacy could have remained low even though they asked a question.

Providers should be aware that patients who ask more medication-related questions may have less confidence they can adhere to their glaucoma medications. Previous analyses from this study have shown that patients who are new to medications are more likely to ask providers questions than patients who have been taking medications.[35] This could be because new patients have not had time to establish confidence in their medication-taking routine. Future studies should conduct more in-depth analyses to explore how being newly-diagnosed with glaucoma may interact with other variables to affect patient-provider communication and clinical outcomes. Asking patients, especially new patients, about their barriers to adherence and referring them to other office personnel (e.g. technicians, nurse educators) who can spend more time answering patient questions and potentially refer them to additional community resources, such as non-profit organizations, may help patients address their barriers, which could potentially improve their self-efficacy and ultimately their medication adherence.

Limitations

This study has several limitations and results should be interpreted with caution. First, study staff did not track the characteristics of patients who declined to speak with the research assistant, so we could not calculate a patient participation rate or estimate the effects of

selection bias. Second, providers and patients both knew the visit was being recorded, but they did not know the study hypotheses. Even if there was a Hawthorne effect,[36] it was likely small, as patient-provider communication behaviors occurred infrequently. Third, due to the relative infrequency with which various types of provider communication occurred, the study coders counted the patient being educated about glaucoma or glaucoma medications during visits regardless of whether the provider was a physician or technician. Thus, we cannot separate out variance in communication effects due to provider type (e.g. physician, technician). Fourth, we quantified communication behaviors in order to include them in regression models. Accounting for the quality of communication could have explained additional variance in medication-taking behaviors and clinical outcomes. Thus, future studies should examine both the quality and quantity of communication. Additionally, patients' self-efficacy was measured immediately after their baseline and 8-month follow-up visits. Thus, it is possible that patients' self-efficacy levels could have been immediately influenced by communication that took place during the visit. Future studies should assess self-efficacy before and after visits to determine whether there are immediate effects of communication on self-efficacy. Also, most patients in this sample were not new to eye drops and may have received education about their glaucoma and glaucoma medications at a previous visit, which could account for the low frequency with which education was provided in the current study.

Our results indicate that educating patients about their glaucoma and assessing their views about glaucoma and its treatment can improve patients' medication self-efficacy. Thus, providers should engage in these communication behaviors during visits with their glaucoma patients, since increasing self-efficacy can improve medication adherence.[13–15] Providers should also be aware that patients who ask more medication-related questions may have less confidence that they can overcome adherence-related barriers and make sure these patients are referred to resources that can help them address these barriers.

Acknowledgments

This project was supported by grant EY018400 from the National Eye Institute and by grant 1UL1TR001111 from the National Center of Research Resources, NIH. Dr. Hartnett was also supported by NIH grants EY015130 and EY017011. NIH had no role in the design or conduct of this research.

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Table 1

Patient Characteristics (N=279).

Characteristic	%(N)
Male	41 (114)
Race	
African American	36 (99)
Non-African American	64 (179)
Age (in years)	
Mean (SD), range	65.8 (12.8), 21–93
Years of education	
Mean (SD), range	15.1 (3.5), 5–26
Health literacy; reading level ≤8th grade	84 (233)
Newly prescribed glaucoma medications	18 (51)
Prior use of glaucoma medications	
Less than 6 months	17 (47)
6 months to less than 1 year	10 (29)
1 year to 2 years	10 (29)
More than 2 years to less than 5 years	16 (45)
5 years or more	28 (78)
Number of glaucoma medications patient is taking *	
One	62 (173)
Two	28 (79)
Three	5 (13)
Four	1 (2)
Glaucoma severity (worse eye)	
Mild	62 (162)
Moderate	21 (55)
Severe	17 (45)
Adherence barriers self-efficacy at baseline Mean (SD), rang	58.9 (5.5), 28–63
Adherence barriers self-efficacy at 8-month follow-up Mean (SD), range	59.0 (5.8), 25–63
Eye drop task self-efficacy at baseline Mean (SD), range	39.8 (2.6), 29–42
Eye drop task self-efficacy at 8-month follow-up Mean (SD), range	39.8 (3.0), 25–42

* Total does not add to 100% due to missing values

Optom Vis Sci. Author manuscript; available in PMC 2017 July 01.

Table 2

GEE results predicting patient adherence-barriers self-efficacy (N=254) and patient eye drop task self-efficacy (N=248) at 8-month follow-up.

Independent variables	Adherence Barriers Self-efficacy β (SE)	Eye Drop Task Self-efficacy β (SE)
Number of glaucoma topics provider educated about	0.35 (0.07)***	0.00 (0.07)
Number of glaucoma medication questions the patient asked	−0.30 (0.07)***	−0.09 (0.05)
Provider asks about patient views of glaucoma and its treatment	0.75 (0.67)	1.01 (0.24)***
Provider asks about patient confidence in using eye drops	−0.80 (0.56)	−0.24 (0.26)
Provider assesses if patient has questions	0.03 (0.29)	−0.05 (0.20)
Provider asks patient to demonstrate eye drop technique	0.30 (0.69)	0.31 (0.37)
Patient age	−0.04 (0.02)	−0.01 (0.01)
Patient gender-female	0.13 (0.53)	−0.63 (0.29)*
Patient race-African American	−2.15 (1.02)*	−0.35 (0.46)
Years of education	0.12 (0.12)	−0.07 (0.32)
Less than 8th grade reading level	1.18 (0.69)	−0.77 (0.54)
Newly prescribed glaucoma medications	0.74 (0.71)	0.34 (0.47)
Number of glaucoma medications patient is taking	−0.02 (0.01)	0.07 (0.32)
Glaucoma severity-severe	−0.40 (0.43)	−0.08 (0.23)
Provider age	−0.01 (0.03)	0.00 (0.01)
Provider gender	0.51 (0.51)	0.36 (0.52)
Baseline self-efficacy score	0.62 (0.08)***	0.62 (0.07)***

* p<0.05,

** p< 0.01,

*** p<0.001

Note: Baseline adherence barriers self-efficacy was controlled for in the adherence barriers model and baseline eye drop task self-efficacy was controlled for in the eye drop task self-efficacy model